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APPENDICITIS IN CHILDREN 14 YEARS OF AGE AND UNDER.

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It is not my intention to go into the well known phases of appendicitis in general, but to recall some of the interesting points that have arisen in my practice, making a résumé of my observations of some value to myself at least. As a basis for relative importance of the various points in pathology, symptoms and diagnosis as well as treatment I have minutely studied 313 patients 14 years of age or younger who have suffered with appendicitis. There were 175 boys and 138 girls. This age limit was selected because it was hoped that the various inflammations and complications arising within the female pelvis and abdomen in later years would be eliminated. The results of the operations have verified this hope.

The relation existing between acute onset and chronic onset was as 7 to 1. Chronic appendicitis probably does occur in these young children, but it is not often seen or recognized by the physician. The reasons why are quickly understood. The attacks of pain are not severe and home remedies suffice to alleviate the condition. A child suffering from this chronic inflammation may show malnutrition, slow growth, constipation, sagging colon, foul breath and general ill-health, coupled with an especial tendency to contract "colds". Indigestion attacks occur with or without headache. No action looking toward removal of the cause is taken by the family because the obscure symptoms do not point definitely to the appendix. An overdose of cathartic, a period of prolonged constipation or diarrhea may lead to acute symptoms, which expose the basic trouble, and the patient is seen by his physician and placed at once in the category of acute appendicitis. *X*-ray examination of the intestinal tract may not be helpful, nor does the visualization of an appendix after preparation and barium ingestion always mean an inflamed organ; but it does usually mean a poorly draining organ which favors fecolith formation or the lodgment of a foreign body within the lumen, which may lead to mechanical irritation with localization of pernicious bacterial activity terminating in an acute inflammatory attack.

Pathology: The strongest impression from our series is that the pathology is uncertain; by that I mean its exact interpretation in these children as elicited by symptoms and physical findings is not to be relied upon. Where there is suspicion of pleurisy, hidden or central pneumonia, or early bronchopneumonia in a child we should wait. The mortality from ruptured appendices is certainly lower than that of lung afflictions aggravated by the administration of inhalation anesthesia. An unusual position of the head of the cecum and the appendix must be constantly borne in mind, especially failure of the cecum to descend, permitting a final resting place of the appendix just beneath the liver. One patient presented this anomaly to which I called attention in a clinical report some years ago. Three of our patients had foreign bodies in the appendix which may have acted as a mechanical cause favoring bacterial localization. One had an acorn, another a pin and a third a group of toothbrush bristles swallowed en masse and carried to the appendix. Ten per cent. (32 patients) of all were recorded as having fecoliths in the appendix.

Colitis and enteritis usually not characterized by blood in the stools may precede, accompany, or follow attacks of appendicitis and appendicectomy as noted in this series. Fourteen patients had diarrhea before, 4 during, and 7 after the attack and operation. None of these gave evidence of typhoid; all gave a poor prognosis and one had a small perforation of the cecal head near the base of the appendix as shown at operation. The post-operative diarrhea is the most difficult to overcome. Whether it is caused by the organism present in the appendiceal abscess getting into the bowel or is the organism responsible for the primary trouble of which the appendicitis is merely the predominating acute symptom, I cannot say. Repeated examinations of stools in cases of this type, often without fecal fistula, have failed to reveal any organism other than the usual intestinal flora.

We have made it a practice to look for acute appendicular complication in fresh infections or infectious diseases in childhood. They go hand in hand. Some of our cases have reversed this order. Acute parotitis, mastoiditis and other acute abscesses, especially in bones, have followed acute appendicular

abscesses in these children. The streptococcus hemolyticus, the most virulent of all types, the habitat of which is in the tonsils, is found in about 5% of freshly infected appendices examined bacteriologically. It is killed in two to four minutes in ordinary gastric juice, so has little chance to pass through the lumen of the gastro-intestinal tract. It may arrive via the blood stream.

In children the omentum is one great disappointment as a factor against the spread of intra-abdominal inflammations. It is a scrawny, thin membrane, as a rule, short, devoid of much fat and with a vascularization relatively poor as compared with the adult. One cannot depend upon it for help nor can one tell how secure or complete the walling off attempted by the omentum is. The fragile wall formed by the omentum may give way when least expected; it may fool the surgeon by its seeming control of the situation as far as abdominal protection is concerned. If it gives way, when present in the field as a protector, general peritonitis follows, for which secondary operation offers little hope of cure on account of the small resistance of childhood and the impossibility of draining the numerous small pus pockets that develop. Generally gravity, omentum, intra-abdominal contour and upright position tend to cause appendiceal abscesses of relatively slow origin to point down into the pelvis. General peritonitis, wide-spreading, with little apparent resistance, does occur. In this series 18 patients had general peritonitis when first admitted (6%); 82 had intra-abdominal abscess (26.8%); 87 presented ruptured appendices (27.7%); and 73 gangrenous appendices sometimes ruptured or surrounded by abscess (23.3%). I have found the gangrenous appendix floating freely in an abscess.

Trauma may be a factor in causing an acute onset of the disturbance. Six of our patients (2%) gave a distinct traumatic history—kicks in the abdomen being the most common injury.

Four patients had post-operative pneumonia; all recovered.

The count of the white blood corpuscles is of disputed value. In this series a high leucocyte count, 10 to 35 thousand, was present in about an equal number of patients having unruptured and ruptured appendices. However, a low leucocyte count, below 10,000, was found 9 times as frequently in unruptured appendices as in ruptured.

Nineteen patients died. An analysis of these 19 cases shows that:

All fatal cases had catharsis before admission.

All had a strong initial leucocyte reaction—15 to 35 thousand.

18 had gangrenous or ruptured appendices, of which 7 had apparently walled off abscesses, while 9 had general peritonitis at the time of operation.

2 patients were apparently given inadequate drainage.

4 deaths came late, following secondary operation 1 or 2 months from the time of the first operation. Two of these deaths followed closure of fecal fistulae, and 2 followed late secondary drainage.

One death was attributed to the ether anesthesia.

There were 8 operations for drainage alone, and 11 for appendicectomy and drainage in these 19 patients.

Symptoms and diagnosis: The regular symptoms of cramp-like abdominal pain, vomiting, abdominal tenderness, usually becoming localized, and fever, were present in varying degree in these patients. It is surprising what a large percentage of the attacks have an onset with chill, and sweating is present in over 80% of the patients. Constipation, diarrhea, cough, urinary symptoms (especially frequency), and abdominal distention with or without tumor mass are frequent enough to be remarked as prominent symptoms. Symptoms referable to the chest are often misleading; their interpretation must be made on a repeated chest examination and delay is proper if there is doubt.

In the presence of an acute attack where the inflammation is walled off by intestines and omentum or lies retrocecal, a visible and palpable abdominal tumor may be present. If this is accompanied by a high leucocyte count and some subsidence of symptoms after a couple of days, the whole simulates an abscess and the surgeon may be willing to procrastinate to permit further secure walling off. This is unwise because in some instances the appendix has not yet ruptured and an immediate operation with removal, without stirring up the wall of safe adhesions toward the general peritoneal cavity, is both strongly indicated and safe. If an abscess is present it should be drained as soon as recognized on account of the instability of the walling off. Among children from 3 to 5 years of age a quickly formed tumor mass, which is really an abscess following early rupture of the appendix, may invade the left lower quadrant of the abdomen. Vomiting and other symptoms coupled with this tumor mass often lead to a diagnosis of intussusception, the physician being further fooled by a mass pointing toward the rectum discovered if he made a rectal examination. Naturally these little patients are operated upon for one diagnosis or the other, but if a mistake in diag-

nosis is made and an incision on the left side follows, there is great danger of operative spread of the infection over the peritoneal cavity before the abscess is recognized.

There is great difficulty in localizing abdominal tenderness and pain of appendicitis in the early stages in children. One cannot rely on their statements, especially so if they are very toxic or have vomited much.

The amount of pain in the attack may be far from a true indication of the pathology present. Acute overwhelming infections which lead to early gangrene or perforation of the appendix may cause but little pain. We must all be aware of the subsidence of the pain and the apparent improvement in the patient's condition after perforation occurs. Many patients with periappendicular abscess already present were labelled subacute appendicitis by the first physician seeing them, largely because the fever record was low. With these patients the time elapsed since onset is an important factor.

I cannot recommend too highly the value of a rectal examination in attacks of suspected appendicitis in children. When a child will not permit abdominal palpation, a finger in the rectum may reveal tenderness on one side or the other, may find the bulging mass of appendiceal abscess or satisfy on other points. When the abscess mass presses strongly below it may be easily and safely opened into the rectum.

Treatment: Fully 95% of the patients in our collection had one or more doses of cathartic after the onset of the attack. Castor oil was the favorite method of assault on the inflamed appendix disguised as the "belly-ache". Castor oil is probably responsible for 50% of the ruptures of the appendix before they reach the surgeon's hands. We all know that ruptured appendices have a slimmer chance of recovery than the unruptured. Castor oil should be shunned as a cure for acute abdominal pains and acute constipation in children. Forcing the bowel movement by repeated doses invariably forces a rupture of the appendix. Don't use cathartics under any circumstances where appendicitis is suspected. Nature is trying to protect the child by holding the intestines still and possibly by emptying the stomach by vomiting. Leave well enough alone. Our investigation proves that practically all children in the throes of an acute appendiceal attack, who are given a cathartic at night, are taken to the hospital the following morning.

For reasons stated, it is our belief that in suitable surroundings children under 14 years of age attacked by appendicitis should be operated upon at once. The extent of the disease is uncertain, the amount of resistance and local walling off within the abdomen is trebly uncertain. Nothing can be gained by waiting.

If the appendix has not ruptured, no drainage need be employed. But suppurative peritonitis may follow the removal of a so-called catarrhal inflammation of the appendix. The wounds of some of this class will also become infected and will require opening for later drainage. Usually this is caused by contact of the bowel, especially the bowel where cut open in removing the appendix or by soiling with contents of the appendix. Do not let the open wound of the appendicectomy at the head of the cecum, nor the removed organ, come into contact with the freshly opened abdominal wall. On account of the patient's lowered resistance any technical error which soils either the peritoneum or the abdominal wound with the contents of the intestine may lead to fatal infection.

When abscess is present what shall we do? If it points into the rectum and is large, open it there. Do not adopt a routine line of approach and go in through the rectus muscle regardless of the findings of the physical examination. Always approach the appendiceal mass, whether pus or the rarely matted omentum, from the lateral aspect, that is from the iliac crest. Drain outward, leave the uncertain wall holding the mass from contaminating the whole peritoneal cavity intact. Don't try to do too much and if not experienced, best leave the appendix in and save the patient by drainage alone.

When drainage is made, *drain*. Do not insert a small tube or cigarette drain and then close the abdominal wall close around this tube on which the patient's life really depends. Don't be afraid to leave the abdominal wound wide open. An average-sized opening rarely needs any stitches when abscess is present; it never does when general peritonitis is present. The inflammatory products within the peritoneal cavity tend to flow out toward the point at least resistance, hence we must leave the door of the wound wide open. I use frequently a Mickulicz drain, sometimes modified as in Gibson's type. It keeps the wound open, affords a pathway of least resistance out and yet holds back the intestines. Drain long enough; don't be in a hurry to shorten tubes or remove them; wait until pus no longer oozes out.

If general or spreading peritonitis is present, first do not attempt too much surgery, nor prolong the anesthesia. Use local anesthesia. Drain the iliac fossa and also the pelvis by two long drains inserted just above the pubes. Put the patient in Fowler's

position and get fluids into him. Hot boric acid dressings on the abdomen help. When the peritonitis is so extensive that there is pus everywhere, multiple points of drainage will do little good; two are enough. The prognosis is very poor.

The most difficult instances are those in which too much operative work has been attempted, so that the uncertain protective wall has been torn through by manipulation or the cramming in of laparatomy sponges. Too tight closure around the drainage tube may also invite disaster and the secondary generalized peritonitis with distended abdomen, intestinal paresis and beginning ileus soon overcomes the child. For such patients we need, if it can possibly be withstood, wound opening to search delicately for encapsulated areas of pus, and pelvic drainage with hot abdominal dressings in Fowler's position. Make a rectal examination to see if the pus passes that way. A high enterostomy might save a life; usually the small patient succumbs to the combination of shock and toxemia.

The general admonitions are:

Never use a cathartic as treatment for acute abdominal pain in children.

Operate gently and as soon as a diagnosis of appendicitis is made, approaching from the lateral aspect of the abdomen.

If an abscess is present drain and drain freely. Don't worry about post-operative hernia.

If general peritonitis is present, drain the appendiceal and pelvic areas gently; sit the patient up, and use supportive treatment.

Commit no technical errors in removing a slightly inflamed appendix.

CHRONIC APPENDICITIS.

The attitude of the average surgical mind toward results in public is about this: if a patient is relieved of symptoms by a Christian Scientist or a chiropractor, there was nothing the matter with the patient; if the patient is relieved of the same set of symptoms by the surgeon, it was a good piece of work. If, after a surgeon had operated, the patient still had his symptoms, he was a poor, miserable neurasthenic. May God have mercy on his soul, because, surgically, he was fixed up right. It is only because of this attitude that the diagnosis of chronic appendicitis, with the consequent removal of the appendix, is still so widely practiced when every reported follow-up in these cases has shown unsatisfactory results in from 30 to 40 or 50 per cent. of cases.—HOWARD L. PRINCE in the *New York State Journal of Medicine.*

CYSTOSCOPIC LITHOTRIPSY.

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Stone in the bladder is a rather rare condition in this region. Excluding cases in which it complicates prostatic hypertrophy, its incidence in my practice including a year-round urologic service in a general hospital of 400 beds is ½%. To acquire skill in lithotripsy it is necessary to practice in a region where stone is common. Some surgeons in India and China report thousands of cases with an exceedingly low mortality. Those of us who practice in regions where stone is rare are seldom deft with a lithotrite; either we leave a few fragments in the bladder or unduly prolong the operation searching for them.

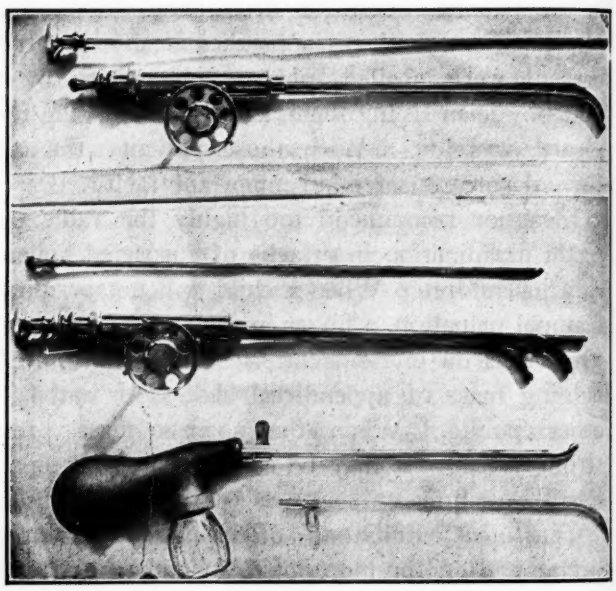

Fig. 1. Cystoscopic lithotrite and evacuator.

Cystotomy under modern technic has so low a mortality and one is so sure to leave no fragments behind that it has become the method of choice. On the other hand a skilfully performed lithotripsy has a still lower mortality and a far shorter convalesence. I well remember a granduncle, a clergyman, who delivered a sermon two days after Bigelow removed a large stone from his bladder.

At the 1921 American Medical Association convention I purchased a cystoscopic lithotrite exhibited there by one of the dealers. The instrument had been made by Wolf of Berlin and was guaranteed to withstand a breaking pressure of 200 pounds. I have tested it on an ordinary stone from the garden, exerting my utmost strength without damaging either the stone or instrument. The instrument is slightly less than 30 French in caliber with a wheel on the side of the handle, a sliding lock being un-

necessary in an instrument used under direct vision. The jaws are roughened but not fenestrated. Crushing being done with the jaws pointing down there is no danger of clogging at the heel. The handle contains the well-known Wolf valve, to prevent escape of fluid from the bladder during introduction of the periscope. There is also an obturator to facilitate introduction, as well as an irrigating tip whose introduction opens the valve. The only criticism that I have to offer is that the prolongation of the tip of the male blade is unnecessary as at times it slightly interferes when grasping a small fragment, and there is no danger of pinching the mucosa under direct vision.

Fig. 2. Approaching the female blade to the stone.

Fig. 3. The female blade advanced over the stone.

I played incessantly with my new toy making calculi of all shapes and sizes of clay and baking them in an oven to stony hardness, far harder than the average calculus, then placing them in a rubber ball seizing and crushing them. I soon evolved a technic making the procedure almost as easy as picking the calculus up and crushing it in a pair of pliers.

Adenoma of the prostate, diverticula that might catch fragments and extreme trabeculation naturally contraindicate lithotripsy. One inexperienced in cystoscopy naturally should not attempt a cystoscopic lithotripsy. The patient is anesthetized and placed in the lithotomy position and the lithotrite is introduced. Opening the valve with the tip of a probe to allow the bladder to empty, wash out until the return flow is clear and then fill the bladder with from six to eight ounces of water or, if preferred, wash out and fill through a catheter first and then introduce the lithotrite. Under no circumstances introduce the lithotrite into an empty bladder for this may provoke bleeding.

With the jaws of the lithotrite turned up introduce the periscope with lens turned down and lamp lighted. When the stone appears hold the periscope firmly in the left hand and, keeping the stone in view, seize the wheel in the right hand and rotate the lithotrite until the tip of the female blade touches the stone (figure 2). Keeping the stone in view withdraw the periscope about one-eighth of an inch and advance the entire instrument the same distance, opening the jaws at the same time. The female blade will then fill a large part of the picture (figure 3). The lithotrite is then turned until over the middle of the stone which can be clearly seen to either side of the blade and through the slot. Raise the handle, which depresses the jaws until the stone is brilliantly illuminated through the slot and thus make sure of taking a firm grip as the jaws are closed on the stone (figure 4). Depress the handle, lifting the stone from the floor of the bladder and crush *slowly* to avoid forcible impact of fragments on the mucosa which might result in hemorrhage. Repeat the procedure on fragments until all seem to be small enough to be evacuated or the field is too full of them for easy grasping. Remove the lithotrite, being sure to first completely close the blades and withdrawing the periscope also be sure to turn the blades up.

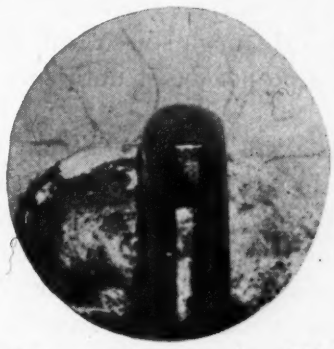

Fig. 4. The jaws are closed on the middle of the stone.

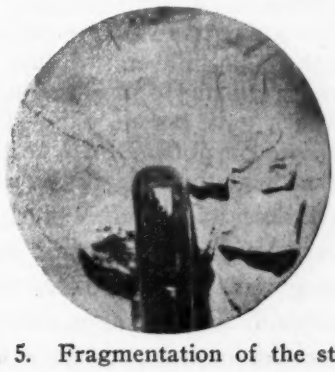

Fig. 5. Fragmentation of the stone.

Pass the largest evacuator catheter the urethra will admit. A rush of sandy water ensues. Fill the evacuator (I prefer the Chismore) with water, and attach it to the catheter. Squeeze the bulb slowly, then count twenty to allow fragments to settle, then let go and the fragments will tinkle into the bottle. Repeat this until no more fragments come.

If you believe the bladder to be clean introduce an examining cystoscope. Otherwise reintroduce the lithotrite and crush all fragments found. In all cases finish by a thorough search with the examining cystoscope, and do not desist until sure the bladder is clean.

This lithotrite will not grasp a stone much larger than one inch in its shortest diameter. If it exceeds this use a Bigelow instrument for the first few smashes employing the technic described in masterly manner by Cabot in "Modern Urology".

The only case upon which I have had an opportunity to use this instrument was an Italian woman, 47 years of age, enormously fat, with the classical symptoms of stone. Cystoscopy showed an L-shaped stone each arm about one inch in length. The urine from the left ureter was loaded with pus and roentgenograms showed a small stone in that kidney. Under ether anesthesia the stone was smashed and evacuated in a few moments. I was surprised how much easier it was to perform the operation on the living subject as compared with the rubber phantom. The woman left the hospital in two days, the bladder symptoms cured, refusing to have the kidney operated upon because it gave her no pain. Cystoscopy a month later showed a normal bladder.

Practice upon phantoms is essential to success. An accurate technic is thus developed, eliminating lost motion in fishing for fragments out of reach. A slight tapping with the tip coaxes them into advantageous position. As far as possible, avoid leverage or side to side motion; endeavor to confine all motion to rotation and slight elevation and depression. Extreme gentleness is essential to avoid bleeding. I regret that I have no other recent cases of stone except in prostatics, from whom I removed them through the suprapubic incision. However, I am convinced that the cystoscopic lithotrite is a valuable instrument and I hope to supplement this brief report with more cases in the future.

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OPERATIVE CYSTOSCOPY.

Operative cystoscopy, with the further mechanical improvements in cystoscopes, urethroscopes and accessory instruments, has become a broader field of great usefulness. The removal of foreign bodies, calculi and tissue for diagnosis; the destruction of tissue outgrowths about the vesical neck and of benign papillomata by fulguration, as well as local bladder treatments, are some of the achievements.—H. G. BUGBEE in *The Journal of Urology*.

CONGENITAL SYPHILIS AS A FACTOR IN JOINT DISEASE.*

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About five years ago I published in *The Journal of the A. M. A.*[1] an article on syphilis and tuberculosis of joints in which I expressed the opinion that clinical differentiation between tuberculous and syphilitic bone and joint lesions in children was impossible, and that the Wassermann test was of very little help as it was often negative even when the family and personal histories were positive and the lesions cleared up under the influence of mercury and potassium iodide. In an endeavor to meet the criticism which these views called forth at the time I have continued my observations on the very large amount of material passing through my clinic at the Hospital for the Ruptured and Crippled, with the result that I am convinced that it is the rule rather than the exception that congenital syphilis is overlooked as an etiologic factor in chronic joint disabilities. Recent literature, which I have reviewed for the purpose of concise presentation, supports this opinion.

There is no room for doubt that many joint cases that are pronounced tuberculous are syphilitic and that the term of treatment is unnecessarily prolonged because mercurials or arsenicals are not administered. It may be unreasonable to expect men who have for years complacently followed the teachings of Cheyne, Senn and the pioneers of orthopedic surgery in their diagnosis of chronic destructive joint lesions to appreciate the probable presence of spirochetal infection in these conditions, especially as the text-books of the day contain very little or any form of congenital syphilis and nothing at all of modern knowledge on the subject.

To understand the far-reaching effect of congenital syphilis one must keep constantly in mind certain characteristics of the spirocheta pallida, namely, its almost limitless virility, its transmissibility to succeeding generations, its peculiar property of existing harmlessly in the human body for years and then suddenly embarking on a career of tissue destruction, and also the nature of the inflammatory process which its presence excites in the fetus.

The virility of the spirocheta pallida has been well illustrated by Warthin[2] who, in 750 consecutive autopsies, found active syphilitic lesions in 300 subjects, in the majority of whom syphilis had not been suspected during life, and it is therefore likely that

*Read before the Orthopedic Section of the New York Academy of Medicine, January 19, 1923.

many of the bodies were infected either prior to or at birth.

Canestrini[3] relates a case of tabes in an adult due to inherited syphilis and quotes a case reported by Hösslin. Galliot[4] reports two similar cases in patients aged 29 and 36, respectively. In an article on the infectiousness of latent syphilis Eberson and Engman[5] show the results of experimental inoculation with material from inguinal glands and semen taken from one to forty years after the original infection. Active spirochetes were isolated from this material and introduction into rabbits' testicles produced typical syphilitic lesions. Thus it appears that the propagation of spirochetes is carried on in human tissues over amazingly long periods of time without eradicating their potential virulence.

The transmissibility of spirochetes to the third generation, once a much debated question, is now apparently no longer open to argument. Nearly all observers of experience have reported cases of this type, and if proof were wanting Levaditi's demonstration of active spirochetes in the ova of syphilitic children would close the door to doubt as to the possibility of transmission to the third generation.

The resistance of the spirocheta pallida to drug action has been studied by various writers[6] and their findings indicate that too much should not be expected of therapeutic measures. They produce an amelioration of clinical symptoms which is followed by a period of latency during which the organisms are still harbored in the body tissues, and while they are not destructively active, they are, nevertheless, a constant menace. Continued observation of some of my earlier cases convinces me that although patients may become symptom-free in a relatively short time, the danger of relapse is always present.

Warthin reports three cases of congenital syphilis who died from salvarsan poisoning in whom the treatment had apparently not in the slightest degree affected the number of spirochetes. In two of these the tissues throughout the body were swarming with them. Death was due to toxic action on the renal epithelium. He also found that spirochetes could be present in enormous numbers in the tissues of congenital syphilitics without producing tissue changes. He found spirochetes at autopsy in cases with acquired syphilis who had been under treatment sufficiently effective to yield negative Wassermann reactions. He does not believe negative Wassermann reactions can be taken as indicating the absence of syphilitic infection. This, he says, is particularly true of congenital syphilis and gumma of the brain. Blaschko[7] agrees with this view and says that in congenital syphilis only about fifty per cent. of the cases give a positive reaction. De Buys and Loeber[8] reported 106 consecutive negative Wassermann reactions of clinically syphilitic children. In my own series[9] of bone and joint lesions positive Wassermann reactions were present in not more than thirty per cent. of the cases submitted to the test.

I have frequently been asked why, if spirochetes can exist in the body without producing a positive Wassermann reaction or other symptoms, they should unexpectedly produce joint lesions or bone necrosis. The impression seems to prevail in the minds of many that the spirochete is at all times a vicious organism which knows no rest. Warthin[11] takes quite the opposite view, saying, "syphilis, after a preliminary invasion and disturbance of the body, tends in the great majority of cases probably to become an infection not much more active or injurious than the streptococci of the mouth," adding, "but at any time the partnership between the body and the spirochete may become disturbed and tissue susceptibility or virulence of the spirochete become increased so that the disease again appears above the clinical horizon." Traumatism, extreme fatigue or an intercurrent infection may be sufficient to impair the protective powers of the body and permit the organisms to get the upper hand. Osler mentions that so small a thing as vaccination may be sufficient to light up an inherited syphilis. Minninger[12] relates the precipitation of profound symptoms in a previously latent neurosyphilis by an attack of influenza. Duke[13] reports several cases illustrating the effect of intercurrent infections, and it is common experience with most of us to have parents relate a history of trauma preceding bone or joint lesions of syphilitic origin. We have had an interesting case of this sort at the Hospital for the Ruptured and Crippled within the year. A boy of twelve sustained a compound fracture of both bones of the leg. The infection became so extensive in spite of surgical treatment that amputation was advised at the first hospital he entered. We gave him the most conscientious surgical care over a period of several months and yet were unable to secure a satisfactory result until salvarsan was administered, when the granulations took on an entirely different appearance and in a few weeks the boy was discharged with his wound completely healed.

In the less active types of disability where metabolic disturbances appear to be at fault, such as some of the arthritides, there is ground for the belief that the endocrine system may have suffered from spirochetal infection in utero[14]. If, as Cavallaro [15] in his classic studies on the dental pathology of syphilis has pointed out, the inflammatory process induced

by the presence of spirochetes in the fetal tissues is a vasculitis or perivasculitis which chokes the avenues of nutrition, thus producing anomalies of form and function in rapidly growing organs, and if we bear in mind the conclusion of Warthin[16] that the pathology of syphilis is essentially microscopic, it is not difficult to believe that the ductless glands, in which spirochetes are frequently found, may sustain sufficient injury in the embryonic stage to affect their function in adolescent and adult life.[17]

There are other types of the arthritides more acute in character in which the toxins of spirochetes undoubtedly play an important part. My records contain several cases of this kind that have yielded to appropriate treatment. Dufour[18] reports ten cases of arthritis deformans in syphilitics and Dupont[19] recorded 18 cases of syphilitic arthritis completely cured by antiluetic treatment, nearly all of which had been mistaken for tuberculosis, gonococcal or rheumatic arthritis. In about 1,000 syphilitis Mohammedans examined by Lacapere and Laurent[20] ten per cent. had joint involvement. Broca[21] relates that of 20 cases of knee joint disease sent to him for an opinion with a diagnosis of tuberculosis, 19 were due to syphilis. Bardaro[22] says that in his experience he has found articular rheumatism of syphilitic origin more often than that from tuberculosis and gonorrhea, combined, adding that modern science has demonstrated that many forms of chronic rheumatism, from the monarticular to deforming arthritis and rhizomelic spondylitis, may yield to thorough treatment as for syphilis. He reports several cases in support of his belief. Caronia[23] found that in 70 children with lesions of the spine and other large joints 72.3 per cent. had inherited syphilis. In 1,100 autopsies Clark[24] found gross joint lesions due to syphilis in 8 per cent. and tuberculous lesions in four-tenths of one per cent.

An unbiased consideration of the evidence supplied by recent literature forces the conclusion that congenital syphilis is so often a factor in the development of bone and joint lesions that it cannot with impunity be ignored, even though the Wassermann reaction may be negative. The therapeutic test appears to be the only means at hand at the present time to determine the question of syphilitic taint, and, if my experience with a variety of conditions to be seen in an orthopedic clinic[25] is a criterion of its usefulness, the results of its routine use will be found not only satisfactory but in many cases gratifying beyond expectation.

CASE REPORTS.

CASE I. Male, aged 12. Osteomyelitis of left tibia following compound fracture. Healing incomplete for four months notwithstanding surgical cleansing and efficient treatment with Dakin's solution. Wassermann reaction negative. After the administration of two doses of salvarsan the appearance of the wound became healthy and repair continued without interruption. Discharged from hospital 6 weeks later.

CASE II. Female, aged 35. Osteomyelitis of femur. Lower two-thirds of bone thoroughly cleaned out, wound treated with Dakin's solution. Incomplete healing at end of six months. Four weeks after the administration of mercury and potassium iodide wound was firmly healed and has not again broken down.

CASE III. Male, aged 30. Destructive arthritis of the carpal bones of the right wrist. Diagnosed as tuberculosis and splinted for several months without change in symptoms. Swelling and pain receded under the administration of mercury and potassium iodide and motion increased. Improvement did not continue, however, and three doses of salvarsan were given. After each dose there was an obvious change for the better and in six weeks patient was able to resume work requiring constant use of this hand.

CASE IV. Female, aged 8. Osteochondritis of left hip. Treated for a year by means of plaster spicas and braces. At the end of this time walked with marked limp. Mercury protiodide, gr. 1-6, three times a day was prescribed. In two weeks flexion had increased twenty degrees and the patient walked with less limp. Three weeks later the limp was hardly perceptible and the girl was indulging in the ordinary active games of childhood without any ill-effect. A radiogram at this time showed considerable increase in the density of the femoral head. Wassermann reaction negative.

CASE V. Female, aged 25. Multiple arthritis involving nearly all the joints of the body, those of the hands, feet, knees, arms and neck being most painful. Hands were entirely useless. Had been unable to follow her profession of teaching for a year and her disability had produced a profound mental depression. Mercury and potassium iodide were prescribed and at the end of three months the patient had practically recovered. She resumed her school duties and has remained well five years.

CASE VI. Male, aged 7. Caries of spine, diagnosed as tuberculous by attending physician, who advised plaster jacket or brace. Wassermann reaction negative, but slow to go. Roentgenogram showed a lesion of the fourth and fifth lumbar vertebrae. A circular skin lesion was present on the calf of the leg and one on the ankle which had been unaffected by several weeks treatment. Child was listless, disinclined to play and was continuously losing weight. As there was dental evidence of inherited syphilis he was placed on mixed treatment. In two weeks the skin lesions were entirely healed. Improvement in his general condition was continuous. In two months he had gained five pounds in weight and was very active. A roentgenogram showed increased density of the affected vertebrae. At the end of six months he was clinically normal.

No spinal support was used.

CASE VII. Male, aged 4. Osteomyelitis of left radius and right tibia. Enlarged cervical glands in infancy. Operated upon when about two for bone lesions of wrist and tibia. These never completely resolved. Child walked with limp due to osteomyelitis of tibia. Necrotic bone removed and mercury and potassium iodide prescribed. The leg wound healed readily and the distal end of the radius became smaller and less sensitive. In six weeks it was of normal size. Child became more active and mentally more alert. Has remained well for more than a year. Both mother and child have dental evidence of inherited syphilis.

CASE VIII. Female, aged 16 months. Referred with a diagnosis of tuberculosis of right knee, the conventional symptoms of which were present. Child also had a dactylitis of fourth finger of left hand. Response to mixed treatment was prompt, and in three months the patient was clinically normal and has remained so for five years. At the end of this period her brother was brought in for circular skin lesions about the knees and legs which cleared up under mercury and potassium iodide. The father has stigmata of congenital syphilis but never had an acute infection. The paternal grandfather died of tabes.

CASE IX. Male, aged 19. Osteomyelitis of left elbow following fall without abrasion of skin. Treated for acute osteomyelitis and operated upon three times. When the patient came under observation the elbow was enormously swollen, hot and tender and there were twenty-one sinuses about the joint secreting a thin, yellowish, somewhat albuminous material. Some of the lesions had a "punched out" appearance with dark red margins. There were also two sloughing operative scars about five inches long on the posterior aspect of the joint. Wassermann reaction was negative but the family history suggested syphilis. Patient's mother had had twelve children, seven of whom died in infancy. The paternal grandmother had eleven children, eight of whom died in infancy. The father had no evidence of syphilis. Under the administration of large doses of mercury and potassium iodide the condition improved promptly, but progressed only to a certain point. Salvarsan was therefore given and complete resolution of all lesions followed. The Wassermann reaction was at all times negative.

CASE X. Male, aged 25. Since childhood this patient was treated for tuberculosis of the spine at very great expense, the treatment having included an Albee operation in which the graft did not take, and annual sojourns in high altitudes. When he came under observation he had been in bed for more than a year and had seven profusely discharging sinuses. A few weeks after the administration of mercury and potassium iodide the discharge from the sinuses became less, and there was a gain in his general condition. Improvement was continuous until all of the sinuses healed. He has been without symptoms for about a year and is at present engaged in active business, being apparently normal except for the deformity produced by partial destruction of two vertebrae. This case becomes particularly instructive when compared with Case VI, in which the lesion was similar, indicating that a proper diagnosis in childhood would have saved years of invalidism.

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BENIGN GIANT-CELL TUMOR OF BONE. ITS DIAGNOSIS AND CONSERVATIVE TREATMENT.

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In *The Journal of the American Medical Association*, (April 1, 1922, **78**, 971) an editorial reference to Martland's paper (*Proc. N. Y. Path. Soc.*, **21**, 102, 1921) brings out the most important point in the diagnosis and treatment of central lesions of bone in adults by calling attention to the fact that the so-called "medullary giant-cell sarcoma" is a benign growth for which amputation is rarely necessary.

Historical Data. Sir James Paget (*Lectures on Surgical Pathology*, Lindsay & Blakiston, Philadelphia, 1854) in Lecture 28, Part 1, page 446, of this splendid contribution to surgical pathology calls attention to this benign giant-cell tumor of bone under the name *myeloid* (marrow-like) *tumor*. He writes that M. Lebert was the first to distinguish this lesion as a separate kind of tumor (fig. 7). Both

Paget and Lebert, were of the opinion that it is distinctly benign and never gives rise to metastasis, but Paget states that other pathologists include this "myeloid tumor" among the sarcomas and especially osteosarcoma, and that the usual treatment is amputation.

Paget's description of the characteristic gross appearance of this benign giant-cell or myeloid tumor has never been equalled before or since.

It is very interesting to record, in addition, that he described other central tumors of bone (medullary) which are very difficult to distinguish from the benign myeloid tumor, but which, from their local growth and death from metastasis must be looked upon as sarcoma.

Fig. 1. Path. No. 13025. Hind's Case. Giant cell tumor, lower end of right femur. Photograph 20 years after curetting. See Fig. 2 for roentgenogram.

This knowledge, therefore, of the benign giant-cell tumor has been in accessible literature for more than seventy years, and today we can make practically no changes in Paget's description, or in the fact that there may be a central tumor of bone—a sarcoma roentgenographically and microscopically, Ewing, in his recent book on *Neoplastic Diseases* gives credit to Nélaton rather than Lebert.

Why Have Surgeons Amputated for the Benign Giant-cell Tumor? I have reviewed the literature on Bone Tumors in the December numbers of *Progressive Medicine* from 1899 to 1917. I have had personal communications, written and verbal, with most of my colleagues in the American Surgical and the Southern Surgical Associations and with many surgeons in this country and abroad, and the conclusions reached are that surgeons have amputated for the benign central giant-cell tumor because, in the majority of instances, their pathologist colleagues have looked upon the tumor as malignant and called it a sarcoma, and these pathologists have always been able to give an example of tumors which they claimed to be identical and which caused the death of the patients from metastasis to the lungs and, when there was an autopsy, they have found giant cells in the metastatic tumors.

From the time that I first discussed the literature in 1899 up to the present I have always felt that this benign giant-cell tumor first differentiated by Lebert and Nélaton and so clearly described by Paget, was not sarcoma, but some form of granulation-tissue tumor similar to the epulis of the alveolar border of the jaw, the tendonsheath tumor, and a similar giant-cell tumor observed in bursae and joints.

As late as 1914, just before the war, some surgical pathologists in England wrote me personally of their disagreement with the view that the central giant-cell tumor was benign and not a sarcoma, and claimed they had observations of such bone tumors with metastasis to the lung and autopsy tissue to confirm their view.

In the *Journal of Radiology* for March, 1920 (Fig. 3, Pathol. No. 7964) I pictured a roentgenogram of a tumor of the upper end of the fibula, for which the limb was amputated by Codman of Boston about 1910. One year later the patient died of metastasis to the lung. At that time Wright, the Pathologist to the Massachusetts General Hospital made the diagnosis of giant-cell tumor, both of the primary and metastatic tumor. Recently we have restudied these sections together and we both agree that the microscopic picture is not that of the benign giant-cell tumor first described by Lebert and Nélaton, but that it is true cellular sarcoma in which there occur giant cells. It, therefore belongs to the group described by Paget and without doubt this true sarcoma which kills by metastasis is the one that has led to the confusion and in many instances to the conclusion that all central tumors of bone containing giant cells are sarcomas, and, naturally, with no other data, surgeons preferred amputation.

The Views of American Surgeons on Bone Tumors. It is important to remember that malig-

nant tumors of bone are relatively infrequent, even in large clinics, and very few American surgeons or pathologists have paid much attention to them. An amputation is a very simple operation, while the diagnosis of a bone lesion, even today with our greater knowledge and with the *x*-rays, is still a very difficult problem. Then, again, until recently patients with central and periosteal les-

Fig. 2. Path. No. 13025. Giant cell tumor. lower end of femur. (Hinds' case.) Roentgenogram 20 years after curetting, showing almost complete ossification of bone cavity.

ions came under observation late—the tumors were large, and there was much bone destruction. Amputation seemed to be the only method of removing the local growth. The benign central giant-cell tumor may produce complete destruction of the bone shell. I called attention to this in my articles in *Annals of Surgery,* August, 1912 and April, 1919. It was natural, therefore, for surgeons to amputate.

Before the Philadelphia Academy of Surgery in 1899, John A. Wyeth of New York read a paper on amputation for sarcoma of bone (*Annals of Surgery,* 1901, **34**, 375.) I discussed this paper in the meeting and again in *Progressive Medicine* (December 1902, page 151.) Wyeth at that time seemed to express the prevailing view of American surgeons that for sarcoma of bone, no matter what its location, the treatment should be exarticulation of the limb at the hip—or shoulder-joint. He claimed about 37% of cures. At that time, with very little evidence, I expressed the view that I could not agree with this extreme position and that I felt that many of Wyeth's cured cases belonged to the benign giant-cell group for which amputation was rarely necessary. Since then I have been able to study the specimens and sections of many of the cases reported by Wyeth as cured, and all of them proved to be benign giant-cell tumors.

Nineteen years later in *The Journal of Radiology,* March, 1920, I was able to report but two five-year cures in periosteal sarcoma which repre-

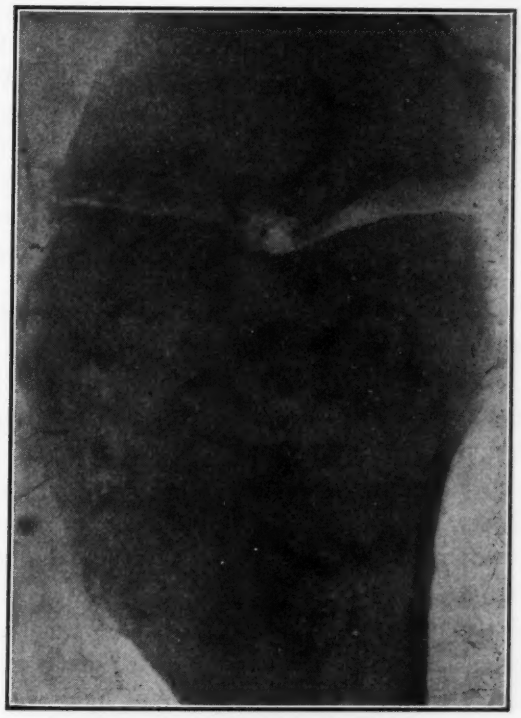

Fig. 3. Path. No. 4520. (Bloodgood's case.) Roentgengram of giant-cell tumor, upper end of tibia. Taken before operation in December, 1902.

sented about 4% of the total cases observed by me, and 2 five-year cures in central sarcoma which represented about 10% of the total. From this group the benign giant-cell tumors were excluded. At that time I had 50 cases, not one of which had died many years after operation from other causes.

The registration of cured bone sarcomas undertaken by Codman had proved the rarity of a five-year cure of a proved periosteal or central sarcoma. Many surgeons in this country have registered with Codman cases of bone sarcoma well five years after amputation which, on restudy, proved to be the benign giant-cell tumor.

In view of these facts it seems unfair to criticize American surgeons for their attitude towards central lesions of bone and their treatment by amputation. But their future attitude should change, as we now have ample knowledge for a plan of attack which will allow us to save the limb whenever it can be done.

History of Curetting for the Benign Giant-Cell Tumor. This is based on 79 cases of which I have

the records and a critical review of the literature in the December numbers of *Progressive Medicine* from 1899. It is sufficiently complete to establish the fact that at least since 1894 surgeons in Europe, and later in this country have curetted for the central giant-cell tumor and accomplished cures with preservation of the function of the limb.

In my own records the relative proportions of curetting, resection and amputation among 77 cases has been as follows: curettings 42; resections 23; amputations 12.

According to decades:

	To 1899	1900 1909	1910 1919	1920 etc.	Totals
Curetting	1	8	19	14	42
Resection	0	3	17	3	23
Amputation	4	4	2	2	12
Total	5	15	38	19	77

The above table demonstrates that the relative proportion of curettings is steadily increasing, while that of amputations is decreasing.

Resection, on the whole, means that the operator viewed the tumor as benign, but preferred resection for functional results.

Koenig, 1894. Halsted, at about this date, told me that Koenig had curetted for the giant-cell tumor, and I found a short description of his few cases in his *System of Surgery,* 1894. This establishes the fact that Koenig, the most scholarly of German surgeons of that time, held the same view as first described by Lebert, Nélaton and Paget.

Frank Hinds, 1895. The example of a benign central giant-cell tumor operated upon by Hinds in 1895 and reported in the *British Medical Journal,* February 26, 1898, in my opinion is the real beginning of curetting as a curative measure for this bone tumor. The operation was accidental, as the preoperative diagnosis was osteomyelitis. The patient, a male, aged thirty-four, had observed pain and swelling of the lower end of the femur for fifteen months; yet, he was able to walk and work. There was a palpable expansion of the lower end of the femur. At the operation an expanded bone shell was exposed so thin that Hinds could cut a piece out with the scissors. The exposed growth filled the condyles and everywhere there was a thin bone shell. The tumor tissue was red in color, easily removed with a sharp spoon. The bleeding was profuse; it was checked with the tourniquet; the bone cavity was then cauterized with a solution of chloride of zinc and packed with gauze. Six weeks later the cavity was again curetted and scrubbed with a solution of zinc chloride. The microscopic report from the first operation was "myeloid sarcoma with numerous giant cells."

I have had frequent correspondence with Hinds in regard to this patient, the last letter dated January, 1922, about twenty-six years after the operation. Figure I is a photograph of the patient in 1919. The wound had completely healed; there is perfect function; during the war the patient wrote me that he was felling trees in Wales. Sections of the original tumor have been sent me, and the picture is that of the benign giant-cell tumor. A roentgenogram after operation shows practically complete ossification of the huge cavity (fig. 2).

This case curetted by Hinds twenty-six years ago is still the largest tumor subjected to curetting; none has better functional results, nor a more perfect healing of the wound, and none shows better ossification of the cavity.

Fig. 4. Path. No. 4520. (Bloodgood's case.) Showing the cavity 3 months after operation. The giant cell tumor occupying the upper end of the tibia has been curetted. This wound never completely healed and 19 years later a cancer developed in the unhealed ulcer.

From my observations since this case, I am of the opinion that the chemical cauterization with zinc chloride was the essential feature of the operation.

Karewski, 1898. (*Berliner klin. Wochenschr.,* August 22, 1898) reported a case of giant-cell sarcoma of the upper end of the tibia treated by curetting in Israel's clinic, and the patient was well one and one-half years after operation. The *x*-ray picture after operation (*Progressive Medicine,* December, 1899, page 242, Plate IV) shows that the tumor occupied the inner head of the tibia only, and there was not complete ossification of the bone cavity after curretting.

Kraemer, 1902 (*Archiv f. klin. Chir.,* 1902, **46,** 792) reported two cases of central giant-cell sarcoma of bone which have remained well eight and twelve years after curetting. This would indicate that in one case the operation was in 1890 and in the other in 1894. I have been unable to confirm the diagnosis in these two cases and as the ages of the patient were 16 and 13 years, it is possible that they may have been benign bone cysts with giant-cell areas in the ostitis fibrosa.

Bloodgood, 1902. P. N. 4520. (*Johns Hopkins Hospital Bulletin,* May, 1903, **14,** 133). In December, 1902, more than 19 years ago, I curetted a giant-cell tumor in the upper end of the tibia (fig. 3). The bony shell was intact. After curetting I swabbed the bony shell with pure phenol followed by alcohol and packed the wound on account of hemorrhage. The wound healed by granulation, except a small area in the upper portion (fig. 4). As the wound remained unhealed so many years, I advised the patient to have the small ulcerated area excised, fearing the development of secondary carcinoma which often takes place in the unhealed wound after a burn. This was done in December, 1921. A piece was excised with the cautery by Loder of Boston and sent to me. It proved to be a carcinoma spinocellulare. Loder amputated December 20, 1921, nineteen years after the curetting. It is the first carcinoma that I have observed in an unhealed wound following an operation.

It is important to note therefore, that Hinds used zinc chloride and I used pure carbolic acid and alcohol, after curetting. Of these two cases we have tissue and sections today confirming the original diagnosis; there is no question as to the ultimate cure in either, nor as to the functional result. Hinds' case emphasizes the importance of the ultimate healing of the wound; mine the danger of leaving the wound unhealed.

Curetting by American Surgeons. (1900—1909.) G. D. Davis, Philadelphia, 1904, (*Univ. of Penna. Med. Bull.,* 1905, **18,** 249), lower end of ulna; well 17 years (figs. 5 and 6).

William J. Taylor, 1906, Philadelphia, (*Progressive Medicine,* December, 1906, p. 227), lower end of the femur; recurrence; amputation; well 14 years.

Da Costa, Philadelphia, 1909, external condyle of femur; recurrence; second operation; excision of condyle; well 10 years.

Chambers, Baltimore, 1908, lower end of radius; second curetting; well 11 years.

Beck, Chicago, 1909, lower end of radius; recurrence; amputation; well 10 years.

Mathews, New York, (*Annals of Surgery,* 1910, **52,** 389), shaft of tibia; well 8 years.

In the general index of the *Annals of Surgery* from 1885 to 1909 there is but one reference to myelogenous sarcoma for which resection was done. The term giant-cell sarcoma or tumor does not appear and curetting is not mentioned.

1910 *to* 1919. In this decade George Barrie, New York, (*Annals of Surgery,* August, 1912) began his interesting and important contributions on the benign giant-cell tumor, advocating the term *chronic hemorrhagic osteomyelitis.* He emphasized the benignancy of this central bone lesion, and advocated curetting. During this decade I received personal communications of cases curetted from Frazer of Philadelphia, Silver of Pittsburgh, Prince of Rochester, Dean Lewis of Chicago, Brackett of Boston, Buchanan of Pittsburg, Wainwright of Scranton, Harris of Texas, Clark of Atlanta, Sherman of San Francisco.

Fig. 5. Path. No. 6893. (Davis' case.) Roentgenogram before operation in 1904, showing the giant cell tumor in the lower end of the ulna. Operation curetting. For roentgenogram of result see

In the *Annals of Surgery,* August, 1910 and August, 1912, I published my experience on Bone Cysts and Giant-cell Tumors, calling attention to the benignancy of these lesions and to their conservative treatment. In the *Annals of Surgery,* April, 1919, I reported cases of benign giant-cell tumor with perforation or complete destruction of the bony shell and gave evidence that showed that such destruction of the bony shell, even with infiltration of the soft parts outside, was not associated with my increase in malignancy.

In the last decade, *since* 1920, I have personal communications from Gaenslen of Milwaukee, who in addition to curetting implanted radium; Watts of the University of Virginia; Wilson of Boston who, in his case, after recurrence after two curettings,

succeeded the third time with curetting and radium. A number of other surgeons in different cities made reports of successful curettings.

This very short review demonstrates that today the majority of surgeons recognize the relative benignancy of the giant-cell tumor, but many still seem to fear the possibility of sarcoma, and when in doubt either resect or amputate. In my conclusions I shall attempt to prove that the rule should be the reverse—that is, when in doubt as to the pathology of a central bone lesion, curet with chemical and thermal cauterization.

Recurrences After Curetting. Among the 42 curettings 26 cases have remained well, 16 recurred. Of these recurrences 6 have been subjected to resection and 4 to amputation.

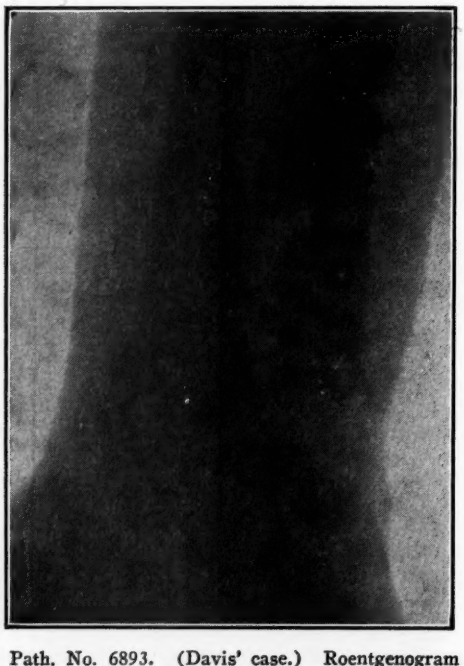

Fig. 6. Path. No. 6893. (Davis' case.) Roentgenogram of result 10 years after curetting giant cell tumor of lower end of ulna. The involved ulna is restored to normal.

This demonstrates positively that recurrence after curetting, even a number of recurrences, is not associated with metastasis, nor with increased malignancy of the local growth. In one of my own cases observed in 1907 the lesion in the lower end of the radius has recurred after two curettings and resection of the lower end of the radius. These three operations by another surgeon had been performed incompletely on the diagnosis of osteomyelitis. I found the recurrent tumor in the defect left by the excision of the bone to be almost encapsulated. It was excised and a piece of bone transplanted into the defect. The patient died ten years later of myocarditis; the function of the hand was good.

As in many cases the data of the first curetting are incomplete, it is difficult to determine the exact cause of the recurrence. As far as my records go the successful curettings have been thorough; hemorrhage had been controlled by the Esmarch tourniquet; and chemical cauterization has been employed. In those cases in which there has been recurrence after curetting, the technic of the original operation has been imperfect, usually because of the hemorrhage which was not checked by Esmarch tourniquet, and chemical cauterization was not employed.

In my own cases in which the primary operation was curetting, now six in number, there have been no recurrences.

Radium and Giant-cell Tumor. My personal observations in a few cases do not confirm the view that radiation is a specific therapy for the giant-cell tumor. Kelly of Baltimore reports a very interesting case. The tumor in the lower end of the radius had recurred after two curettings, and prolonged radiation through the intact bony shell had no effect. Then there was a third curetting, thorough this time, with introduction of radium, followed by an apparent cure up to date. I have records of a similar case. Gaenslen after his first curetting introduced radium, but we have no proof that radium accomplished the cure. The last thorough curetting may have accomplished the result irrespective of the application of radium.

Conclusions as to the Treatment of a Central Bone Lesion with an Intact Bony Shell. If the patient is an adult the possibilities are as follows: The benign giant-cell tumor is the most common lesion; then probably the chondroma, especially in the phalanges, metacarpal and metatarsal bones; third, the latent, or unhealed bone cyst; then the central sarcoma; then some type of metastatic tumor, or the single lesion of a multiple myeloma, and, last, the pure myxoma. (*Annals of Surgery,* December, 1920, **22**, 712.)

The central lesion with intact bony shell may be found accidentally in an *x*-ray examination; this almost excludes the primary sarcoma. Or the patient may come under observation because of pain and swelling. The first thing to do is to *x*-ray other bones. Multiple lesions means the benign bone cyst, or the incurable multiple myeloma or metastatic tumor. Multiple giant-cell tumors are very rare. Bence-Jones bodies in the urine has always been associated with multiple myeloma or metastatic tumors.

From my experience up to date, when the central bone lesion involves a single bone, nothing is gained by delay or radium or *x*-ray treatment. The tumor should be explored. If it involves the upper end of the tibia or lower end of the femur, an Esmarch

tourniquet should be applied to prevent hemorrhage complicating the operation. The bony shell should be opened with the cautery. If the tissue within the shell indicates a benign bone cyst, simple curetting without thermal or chemical cauterization is sufficient. If it is not a bone cyst, or when there is any doubt as to the pathology of the lesion, the tumor tissue filling the bony shell should be removed with the actual cautery (the Percy cautery seems most effective.) Then the cavity should be scrubbed with pure phenol, followed by alcohol, and then with a 50% solution of zinc chloride. If there is no hemorrhage after the removal of the tourniquet, if it has been applied, the wound should be closed, with

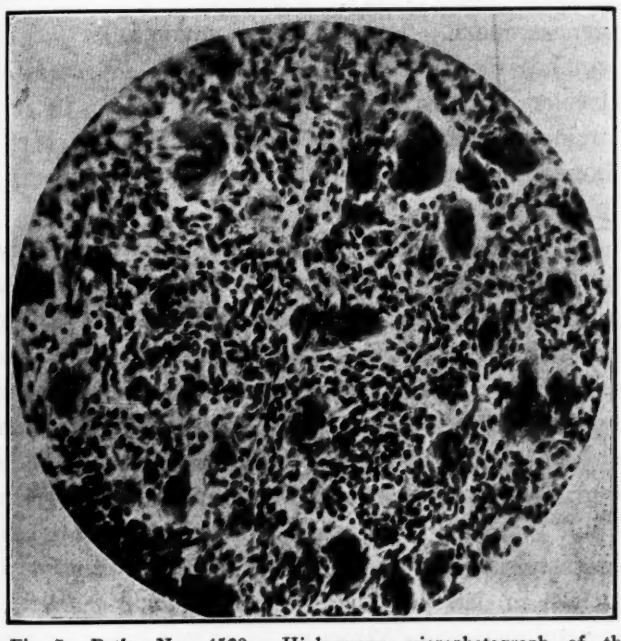

Fig. 7. Path. No. 4520. High-power microphotograph of the typical benign giant-cell tumor. First described by Lebert, Nelaton and Paget.

or without transplantation of bone or fat, according to the size of the cavity. If there is much hemorrhage, pack. If possible, close the wound over the packing. Remove the packing as soon as possible and close the wound with or without transplant. If frozen sections show definitely a sarcoma, introduce radium needles, pack the wound, leaving it open for further cauterizations and radium treatment, and for microscopic study of the tissue reforming in the bone cavity. This was successfully done by Bunts of Cleveland in a central sarcoma of the upper end of the humerus, more than one year ago. Microscopic study of the tissue from the bone cavity after the operation are negative for sarcoma, and the patient is clinically well.

The evidence for this conservation treatment is based upon the facts that a central tumor with an intact bony shell is probably not sarcoma. If it is sarcoma, the chief danger is metastasis to the lung, and this method of attack seems to offer as good a chance of a cure as far as the local growth is concerned as resection or amputation.

I have used this curetting with thermal and chemical cauterization in a number of cases of central lesions of the lower jaw, of the ends of long pipe bones, in the phalanges, metacarpal and metatarsal bones, and have proved that the bony shell remains intact, does not slough and does not interfere with healing, transplantation into the cavity or later ossification.

I believe that this thermal and chemical cauterization of the tumor tissue filling the bony shell, is essential for the giant-cell tumor to prevent recurrence. I am confident that it is vital in myxoma, to prevent implantation of tumor tissue. The same is true of chondroma, and Bunts' observation seems to indicate that it is sufficient for sarcoma if radium is used in addition.

Surgeons must remember that in curetting, tumor tissue, even when benign, may be left behind to grow again, or may be transplanted into the tissue of the soft-part wound to produce secondary tumor. The thermal and chemical cauterization, therefore, is essential not only to destroy the tumor tissue more certainly than would curetting alone, but to prevent transplantation of tumor tissue, and I have demonstrated that it does not interfere with the permanent healing of the wound, nor with the transplant, nor with ossification.

This recent experience has therefore developed a method of attack for central tumors of bone which promises a large percentage of successful results with the least mutilation. We need further experience only with the true sarcoma with intact bony shell. But up to the present time the evidence indicates that in both periosteal and central sarcoma of bone, metastasis takes place so quickly to the lungs, that complete removal of the local growth promises little chance of a permanent cure. Therefore, mutilating operations for bone tumors should never be performed until the diagnosis is established without the shadow of a doubt, and in central sarcoma with intact bony shell apparently the conservative operation as outlined here, with the addition of radium, should be the first treatment.

Resection. When the central tumor occupies a bone the removal of which does not interfere with function, this should be the method of choice. This is true in the lower end of the ulna and the upper end of the fibula. I have discussed this problem in *Annals of Surgery,* April, 1919, and in *The Journal of Radiology,* March, 1920.

Central Tumor With Intact Bony Shell, Except Recent Fracture. My evidence up to date seems to

indicate that it is best to wait and see whether the fracture heals, and if, in addition to the healing of the fracture there is complete ossification of the area, operation is not indicated, as this *x*-ray evidence practically proves the lesion to be a benign bone cyst. If the fracture heals, but the marrow shadow remains the same, or if the fracture shows no evidence of healing after four weeks, operate by the same methods of attack as has just been described for the intact bony shell.

Partial or Complete Destruction of the Bony Shell. This may be present in the giant-cell tumor without increased malignancy. If it is associated with true sarcoma, as far as my evidence goes, the condition is hopeless. If properly performed, the curetting operation for the giant-cell tumor with partial or complete destruction of the bony shell should be just as successful as when the bony shell is intact, and if the defect can be remedied by bone transplantation with the preservation of good function, amputation is not necessary.

Exploratory Incision. This should rarely, if ever be necessary. In a central tumor the operation undertaken should be completed as described. In periosteal lesions it may be necessary to save the patient from an unindicated amputation. Exploration, if done at all, should be done with the cautery. Space forbids discussion of this question, which is not essential in the problem of attack on the central bone tumor.

TUMORS OF THE TESTES.*

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HISTORICAL: Search of available literature discloses the fact that, prior to 1700, Saint Donat described a complex testicular tumor (teratoma) in which he recognized a rudimentary skull with two pigmented depressions probably representing embryonic eyes of a parasitic fetus. Since that early period the publication of many similar observations has induced the conviction that the majority of testicular neoplasms may be correctly regarded as teratomatous in origin; but there is yet no consensus of opinion on that phase of the subject. The literature has now become fairly voluminous, and there has been much controversy concerning both major and minor features.

CLASSIFICATION: Numerous types of testicular tumors, large and small, simple and complex, benign and malignant, unilateral and bilateral, have been recognized and described by different writers. It is regretfully admitted, says Adami, that the variety of forms of testicular neoplasms is bewildering; there is probably no field of pathology in which more divergent views have been and still are current. Some authors classify all tumors of the testes among the true neoplasms, while others contend that nearly all of them may be regarded as teratomata or derivatives. The following varieties or types have been specifically considered:

Adenoma,	Endothelioma,
Adenocystoma,	Chorioepithelioma, etc.
Adenomatous teratoma,	Osteoma,
Chondroma,	Enchondroma,
Chondroadenoma,	Myoma,
Chondrocystoma,	Myomastrioceilulare,
Sarcoma (many types),	Fibroma,
Adenosarcoma,	Rhabdomyoma,
Lymphosarcoma,	Myxoma,
Alveolar Sarcoma, etc.,	Lipoma,
Carcinoma (many types),	Teratoma,
Chondrocarcinoma,	Dermoids.
Epithelioma,	

It is claimed by Ewing, after an exhaustive study, that the commonest testicular tumor is embryonal carcinoma, alveolar or diffuse, with polyhedral or rounded cells and often with lymphoid stroma; and he believes even these tumors are probably one-sided developments of teratomata, and that fibroma, lymphosarcoma, leiomyoma, spindle-celled sarcoma, adenoma, etc., are exceptional or unique occurrences. While there are many who hold contrary views, it is interesting to note that nineteen testicular tumors examined in detail histologically by Wilson proved to be teratoma, and Wilms states that a more careful study of tumors originally classified as sarcomata, carcinomata, etc., would probably demonstrate a "tridermal constitution." On the other hand, Bulkley and many others contend that the majority of testicular malignant tumors are properly classified as sarcomata, which is in accordance with my observation and experience. In thirty-nine of the fifty-nine cases mentioned by Bulkley the pathological diagnosis was some form of sarcoma.

The maze of conflicting pathologic opinion seems unfortunate; it oftentimes prevents a positive conclusion concerning the origin and type of a given testicular neoplasm. In justice to the pathologist it must also be stated that the microscopic picture may be so complex, because of the diversity of histologic structure, that it is difficult or even impossible for him to definitely determine to what class a given tumor actually belongs. Beer says the complexity of the microscopic picture of most of these tumors can be readily grasped when one bears in mind that any kind of tissue (tridermal) may be represented.

*Read before the Louisville Urological Society, February, 1923.

The division of testicular tumors into two main groups, (a) benign, and (b) malignant, would greatly simplify the study of these growths. So long as the neoplasm is demonstrably malignant, it would seem determination of the cell-type is merely of academic interest. It is of equal or even greater importance to determine that a given tumor is actually benign in type. It is recognized that the majority of such tumors are either primarily malignant, or secondarily become so from degenerative tissue changes. Essentially benign tumors of the testes must be rather uncommon, or, if originally benign, they have likely undergone malignant transition when the physician is first consulted. In any event the tumor may vary greatly in size, shape and consistency; it may show either a smooth or a nodular conformation. The epididymis usually remains uninvolved until late in the history of the disease; that is to say, contrary to accepted opinion, malignant neoplastic development begins in the testis and not in the epididymis. While progression of the disease may be tardy or rapid, it is usually the latter, after testicular enlargement has once begun, and later invasion of surrounding tissues is the almost invariable rule.

ETIOLOGY AND INCIDENCE: The primary factor responsible for the production of neoplastic testicular developments, whether benign or malignant, remains uncertain; and this statement is equally true of other neoplasms regardless of anatomic situation.

Undescended testes (abdominal, inguinal) have been considered especially prone to malignant neoplastic development, in contradistinction to those normally situated, but the disproportion noted by various observers is probably more apparent than real. It is realized that undescended (inguinal) testes, by virtue of their peculiar anatomic location, are subjected to almost constant irritation from pressure and repeated trauma; but this is less true of those retained in the abdominal cavity. That pressure, irritation or trauma has any influence whatsoever in the production of malignancy in either scrotal, inguinal, or abdominal testes, seems extremely doubtful.

According to Bulkley, malignancy of an abdominal testis is relatively rare; in general hospital male admissions it is seen about once in each sixty thousand cases; about one in every four cases of malignant abnormally situated testis is found within the abdominal cavity; about one malignant abdominal testis occurs to each fifteen scrotal testicles; about one of each seventy-five retained testes will become malignant.

Among one hundred and ten thousand male admissions to London hospitals during twenty years (Howard) there were sixty-five with testicular malignancy; of these fifty-six were scrotal, nine inguinal, none abdominal. Among twelve thousand seven hundred and twenty-nine males admitted to the Presbyterian Hospital, New York, (Bulkley), there were thirteen with testicular malignancy; of these eleven were scrotal and two abdominal. Eccles found thirty-eight testicular malignancies in sixty thousand males admitted, only one of which occurred in the undescended testis.

Combination of the foregoing statistics shows the following: Of one hundred and eighty-two thousand seven hundred and twenty-nine males admitted to general hospitals, there were one hundred and sixteen with malignant disease of the testicle; of these fifteen were inguinal, or abdominal, the remainder (one hundred and one) scrotal.

INFLUENCE OF AGE: In considering malignant testicular neoplasms, the so-called "cancer age" may be practically disregarded. No age is exempt and such neoplastic formations have been noted in both extremes of life. It is true, however, that the larger number occur between twenty and fifty, i. e., during the period of greatest sexual activity, for which no reasonable explanation has yet been offered. It may be interesting to note, in passing, that so-called "age limits" have been proven largely mythical regardless of the anatomic location of the malignant development. Any type of malignancy may occur in individuals literally "from the cradle to the grave."

LYMPHATICS AND BLOODVESSELS: Without a fairly accurate understanding of these factors it is difficult to appreciate the *modus operandi* by which distant metastases occur during the course of testicular malignancy. It is well known that metastases (early or late) are noted in practically every case of malignant disease involving the testicle.

The testicular lymphatics are quite numerous and begin chiefly in lymph spaces between the seminiferous tubules. From finer plexuses in the vascular tunic and epididymis several large trunks transverse the course of the spermatic veins and terminate in the lumbar lymph nodes. (Leidy.)

The lymphatics of the testis unite with those of the epididymis and visceral layer of the tunica vaginalis and extend along the spermatic cord toward the lumbar region; they are usually more superficial than the bloodvessels. In the lumbar region the trunks leave the spermatic vessels and proceed toward their terminal glands. The right trunks terminate in the right juxta-aortic glands; the left trunks end in three or four glands of the left juxta-aortic group; some of these lymphatics, however, may reach the pre-aortic glands. (Leaf.)

The spermatic artery springs from the aorta below the renal vessels, descends along the psoas muscle, crosses the ureter and external iliac vessels, and enters the internal abdominal ring where it joins the spermatic cord and descends in advance of the deferent canal to the testis. A smaller branch supplies the epididymis; the larger one divides into others which penetrate the albuginea and enter the mediastinum where they are distributed in the vascular tunic, partially on the inner surface of the albuginea, par-

tially along septula between testicular lobes. The deferent artery comes from one of the vesical arteries, follows the deferent canal its entire length and anastomoses with the branch of the spermatic artery distributed to the epididymis.

The spermatic veins pass from the vascular tunic of the testis and emerge from the albuginea in several branches along the posterior surface of the testis where they are joined by others from the epididymis. The veins ascend with the spermatic artery in the anterior portion of the cord and anastomose with one another forming a plexus. From this two or three veins enter the abdominal cavity and unite in a single trunk which follows the course of the spermatic artery; that of the right side terminating in the inferior vena cava, that of the left side in the corresponding renal vein. (Leidy.)

SYMPTOMATOLOGY AND DIAGNOSIS: While early diagnosis is of the utmost importance from the standpoint of the patient, unfortunately there are no early pathognomonic clinical signs by which the existence of malignancy in any situation may be positively recognized, and the testis enjoys no exception to the rule. Pain and tenderness, which are present at some time in the history of every case, may be totally absent until after considerable enlargement of the testis has occurred. However, since these clinical signs are noted in orchitis due to various other causes, they have little significance when considering the probability of malignancy. It must also be remembered that testicular enlargement occurs in tuberculosis, syphilis, and other affections as well as in malignancy. In tuberculosis the process begins in the epididymis, progression is tardy, urinary symptoms are common, tubercle bacilli may be found in the urine and there are usually evidences of tubercular involvement elsewhere; in syphilis and malignancy the testis is primarily implicated, urinary symptoms are generally absent, progression is slow in the former, usually rapid in the latter with glandular and metastatic involvement. Of course the testis may be involved secondarily in tuberculosis, and the epididymis with other adjacent tissues secondarily invaded in both syphilis and malignancy.

Under the circumstances it is inevitable that mistakes in clinical diagnosis will occur in these three diseases, but they are excusable because of similarity in early observable local signs. There are no early general symptoms of importance, but characteristic systemic manifestations (anemia, cachexia, etc.) are always present late in the disease. While the Wassermann and tuberculin tests may have little diagnostic value, they should always be employed.

It must be admitted that in a large percentage of instances a positive early clinical diagnosis of testicular malignancy cannot be made on a basis of the local signs alone; exposure and incision of the testis and pathological examination of sections is the only method of certain differentiation in the early stages.

PROGNOSIS AND TREATMENT: As is true of malignant disease in other localities, the prognosis of malignant testicular growths is exceedingly grave and both the immediate and the remote mortality rate is high. A partial explanation may be found in the fact that patients with malignant disease seldom consult the physician during early or remediable stages. They quite insist that the affection cannot be serious, because it gives rise to no pain or discomfort, hence they continue to procrastinate until the process has extended beyond the limits of curability.

In testicular malignancy the roentgen-ray and radium do not appear to have fulfilled the refulgency which their original promise portended.

The management of malignant testicular growths has been and must remain distinctly surgical. Early diagnosis and immediate orchidectomy with high excision of the cord seem to promise the most favorable ultimate results. It must be remembered, however, that (a) metastasis in the lumbar lymph nodes may occur early, that (b) the situation of these glands renders their palpation uncertain even though infiltrated, except in rare instances, and that (c) when demonstrable metastatic involvement has supervened orchidectomy will accomplish nothing. Following late operation prompt recurrence with fatal termination is the logical and inevitable outcome.

The excessive mortality, due to metastasis and recurrence, following orchidectomy for malignant testicular neoplasms, induced the belief among some of the bolder surgeons that a more radical operative procedure, including removal of infiltrated lumbar lymph nodes, might improve the end-results. The operation which was finally devised is one of great magnitude, and would seem to considerably enhance the clinical dangers, the inaccessibility of the lymphatic structures to be removed requiring an incision extending from the inguinal region upward through the loin to the costal margin. The technic of the procedure, as described by Hinman, is substantially as follows:

The operation is usually performed in two stages, viz., inguinal and abdominal; the first stage is that of ordinary orchidectomy.* For the second stage the patient is placed in a dorso-lateral posture resting on a pad under the costal margin with shoulder and hip on the table. This raises the spine to conform to line of incision and allows good exposure of the deep abdominal vessels. The skin incision is extended from the upper end of the inguinal cut parallel to Poupart's ligament, curving upward in the axillary line at about 4 cm. below the anterior superior spine of the ilium to terminate at the costal margin. If necessary, the upper end of the incision may be extended either anteriorly or posteriorly. The muscle fibers and fascia are divided in line with the skin incision downward to the peritoneum,

*It is extremely important that the testicle be carefully examined at this time and the diagnosis definitely confirmed before proceeding to the extensive abdominal part of the operation. The fact that more than seven per cent of the few cases so far subjected to the radical method of treatment were found on subsequent examination of the specimens to have had syphilitic orchitis shows the importance of this preliminary study. (Hinman.)

which is gently stripped back to expose the lower pole of the kidney and the psoas muscle. The operator may start above at the renal pedicle and work downward, or begin below in the inguinal ring and strip the cord and vessels upward toward the lumbar region. The former method of attack appears the more rational. In cleaning the anterior surface of the aorta the inferior mesenteric artery must be protected. The spermatic vessels and ureter usually remain attached to the peritoneum in the iliac fossa; this region should be carefully cleaned as metastases often occur where the ureter crosses the iliac vessels. Dissection should also be carried upward to include the region about the bifurcation of the aorta. The vas deferens is readily located and divided as it leaves the internal ring. Clean removal of the vascular and lymphatic layer is far superior to palpation and removal of individual glands. Operation for right-sided involvement offers greater difficulties in that the area to be cleaned covers the vena cava. Sufficient drainage should be established because of the large lymph area removed.

It is stated that "the operation presents neither the difficulties nor gravity that would be expected." The patients apparently withstand the procedure well, show no evidence of shock, and convalescence is relatively short. The long incision is objectionable because of the danger of hernia, and it is necessary to divide the tenth, eleventh and twelfth dorsal nerves, and usually the lower branch of the genito-crural. There have been no fatalities from post-operative hemorrhage or other complication as a result of injury to the large abdominal vessels. (Hinman.)

The radical procedure described, according to Hinman, has been performed less than fifty times, principally in France, England and Italy, with an operative mortality of only eleven per cent. Five patients died of post-operative complications,—three of pneumonia and two of peritonitis. Three had syphilitic orchitis and not malignancy. Twenty were said to be living, nine for more than two years, four for more than four years; average time since operation one year and eight months. Sixteen died of cancer, all within one year except two. Duration of disease before operation varied between two months and twelve years; average fourteen months. Lumbar lymph glands were palpable in only two instances before operation, yet twenty-two showed invasion of these nodes after removal; in eleven of these involvement was so extensive as to be considered inoperable. In eight instances lumbar glands removed at operation showed no malignant invasion on microscopic examination.

It is reported that Roberts, of Philadelphia, in 1901, was the first to undertake removal of the lumbar nodes in a case in which clinically they were not involved. The patient died of peritonitis within a few days. "His misfortune has seemed to discourage all other American surgeons, as none has since undertaken the removal of this gland area." * * * "It is now universally recognized by surgeons that operative intervention is contraindicated in every case in which involvement of the lumbar glands can be determined clinically."

I am not an advocate of this ultra-radical procedure, nor have I ever recommended or attempted its execution. I believe that orchidectomy, so soon as the diagnosis of malignancy can be established, will be productive of equally good results. No one can possibly determine in every case whether metastasis has or has not supervened when the patient is first observed. The probable duration of malignancy is not always significant in relation to metastatic involvement, which, as already stated, may occur either early or late in the history of the disease. It must not be forgotten that in testicular malignancy not only are the lumbar lymph nodes invaded, but metastases may also occur in the lungs, liver, and other viscera, with fatal termination from general carcinomatosis. Such was the outcome in the case to be reported herein, and although when orchidectomy was performed no glandular invasion could be demonstrated, clinically, it seems probable that metastatic involvement had already supervened.

The ultimate mortality from testicular malignancy has always been exceedingly high, estimates ranging from forty to eighty per cent., regardless of the method of treatment employed; and for very obvious reasons it appears doubtful whether improvement in end-results can be obtained by utilization of the ultra-radical procedure now being advocated and occasionally undertaken.

CASE REPORT: C. L., aged 28 years, was under the care of a local physician for two months with the mistaken diagnosis of gonococcal epididymitis. There being no improvement, he was then referred to a well-known genito-urinary specialist, and was treated by him for about a month. The latter also failed to make a correct diagnosis, and stated as the reason for non-improvement that "the man had continued to indulge in promiscuous sexual relations." The symptoms had thus existed for three months when the patient came under my observation.

There was then a well-marked left-sided orchic enlargement; there was no involvement of the epididymis. No history of antecedent trauma. The testicle was about the size of an orange, and a diagnosis of probable malignancy was made. The patient was removed to the Deaconess Hospital where orchidectomy was performed on August 30, 1921, as much as possible of the cord being removed. Palpation disclosed no enlarged lymphatic glands in the inguinal regions or elsewhere. He made a prompt and satisfactory operative recovery and was dismissed from the hospital September 10th.

He remained apparently well until the following December when he had an attack characterized by fever and pain in his back, which persisted four or five days. Internal administration of the ordinary coal-tar preparations caused subsidence of these symptoms. In January, 1922, he had a similar attack lasting a few days. There was then considerable increase in severity of the pain throughout the lower part of his back. In March he had another and more severe attack which persisted two weeks.

When seen in April the patient was in a serious

condition, having become emaciated, toxic, and cachectic in appearance. Examination then disclosed supraclavicular, axillary and inguinal adenopathy, and he had developed severe secondary anemia as demonstrated by blood examination. Roentgenography (Dr. Fuget) disclosed a large mass apparently between the heart and the chest wall. It is worthy of note that the patient had never complained of pain in his chest, but there had at all times been more or less discomfort in the lower lumbar region.

In July, intensive *x*-ray treatment with the new high-voltage machine (Drs. Keith and Keith) was instituted, and it was remarkable how quickly the mediastinal mass and the enlarged glands disappeared. In August the patient had a relapse, and early in September was given another series of treatments with the high-voltage *x*-ray apparatus. However, despite this treatment emaciation rapidly progressed, cachexia and anemia became more pronounced, pulmonary hemorrhages occurred, coma supervened, and the patient died in October evidently from carcinomatosis. Autopsy was not permitted.

The testicle removed was submitted to the Louisville Research Laboratory, and the following report was made: "Testis about the size of a large orange, very firm, with numerous engorged blood vessels. Sections show a rather firm mass with numerous hemorrhagic areas, small white areas, also areas of necrosis. Microscopical sections show masses of large round cells with vesicular hyperchromatic nuclei and very little stroma; other areas show small undifferentiated cells. These findings (I think) are characteristic of embryonal carcinoma." (J. D. Allen).

CONCLUSIONS.

(1) Primarily testicular neoplasms may be either benign or malignant in type, and if originally benign they usually undergo malignant transformation secondarily:

(2) The pathologic classification of testicular tumors is uncertain and much useless confusion exists in terminology and nomenclature:

(3) There are no early pathognomonic clinical signs by which the disease may be positively recognized and in consequence diagnosis is oftentimes delayed:

(4) In considering testicular malignancy the so-called "cancer age" may be disregarded.

(5) Metastasis occurs in practically every case of testicular malignancy, primarily in the lumbar lymph nodes, secondarily in the lungs, liver, etc.:

(6) The prognosis is grave and the mortality rate high under any plan of management known:

(7) Treatment is surgical, and orchidectomy prior to metastatic invasion seems to promise the most favorable results:

(8) After metastasis has become clinically demonstrable surgery is futile and fatality from carcinomatosis apparently inevitable.

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MALIGNANT TUMOR OF THE TESTIS; ORCHIDECTOMY; COLEY'S FLUID INJECTIONS; CURE: A CASE REPORT.

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Cures of malignant testicular tumors appear to be so few, relatively, that it is desirable to record all instances for statistical purposes.

—G, athletic, 40, married 3 years, consulted me on April 23, 1912, with an enlargement of the right testicle which had been increasing steadily for seven weeks, during which time, in the belief that the swelling was inflammatory, a physician had been treating it with local applications. The organ was the size of the average tangerine, freely movable within the scrotum, hard, smooth, not nodular, painless to pressure, and associated with a small hydrocele. Examination of the rest of the body was in all respects negative. There was no history of trauma, and neither history nor evidence of tuberculosis, urinary, genital or venereal infection. The Wassermann reaction was negative. A diagnosis of neoplasm was made and orchidectomy was advised.

This was performed three days later at Mount Sinai Hospital. Through an inguinal incision I split the external oblique aponeurosis as far as the internal ring and there ligated and divided the cord structures. The cord and the testicle with its coverings were then removed, en masse, and handed to the hospital pathologist, Dr. F. S. Mandlebaum. In the center of the testis was a soft, hemorrhagic growth which was reported to be a *perithelial sarcoma, chiefly of large round cells, with pronounced evidences of malignancy.*

Between April 30th and June 18, 1912, at intervals of two or three days, I administered twenty injections of Coley's mixed toxins of erysipelas and bac. prodigiosus (Martha Tracy preparation) in doses increasing from 1-4 minim to 5 minims. Doses of 2 minims and over produced temperature elevations to 100°-101°.

At this writing, eleven years since the operation, Mr. G. is in excellent health and has never shown any sign of recurrence.

Recently Dr. Mandlebaum re-examined the slides and sent me the following communication (March 23, 1923):

"I have looked over the slides (No. 504) in the

case of Mr. G., and wish to add the following to my original report:

"There are two distinct types of tumor tissue seen. The one is composed of large round cells suggesting those lining the seminal tubules. Many of these cells show active mitosis. This type of tumor was formerly called 'large round cell sarcoma.' More recently it has been classified as a seminoma by Chevassu. Other portions of the tumor are of a papillary type and the cells here are of a different character, in that they resemble epithelial cells and seem to arise from the walls of small capillaries. One might be tempted to classify these areas as carcinoma but the intimate relationship of blood-vessels and tumor cells shows that the derivation is a vascular one and the tumor should be properly called a perithelioma.

"Although tumors of this type are usually highly malignant a number of recoveries after operation have been reported. These tumors are quite different from the highly complex tumors of teratoid origin frequently found in this organ."

Chevassu[1], who gave to this type of tumor the name *seminome,* found its origin in the spermatoblasts of the adult tubules, and thus separated it from the teratomas. James Ewing's exhaustive study[2] led him to the conclusion that this tumor of the testis ("the common large cell carcinoma") is not derived from the adult tubule cells (spermatoblasts) but is always a one-sided development of a teratoma.

The findings of Hinman[3], who analyzed 32 testicular tumors at Johns Hopkins Hospital, "confirm those of Ewing, namely, that, clinically, all malignant tumors of the testicle are of teratomatous origin." Coley[4], however, is not inclined to accept Ewing's view, nor has it been accepted by all pathologists. Of interest in this connection is the clinical observation that the fresh semen of Mr. G., examined December, 1912, contained only a few spermatazoa, all motionless; his wife has never been pregnant.

Whatever the origin of these tumors and however classified—sarcoma, perithelioma, large round cell tumor, (embryonal) carcinoma, seminoma— there is no dispute concerning their malignancy. Most of them are fatal—very often within a year, but occasionally as late as three years—with local recurrence and (or) metastases in the retroperitoneal lymph nodes, lungs, brain or other organs.

Nevertheless, as Codman and Sheldon's[5] analysis of 64 traced cases at the Massachusetts General Hospital has shown, "the prognosis of sarcoma of the testicle, while bad, is not, when operated, so universally bad as text-books would lead us to infer." Of 56 cases operated upon, 13 were living, 2 to 28 years; 10 died of other affections, 7 months to 26 years after operation. Chevassu[6] reported 47 seminomas with 16 cures of 4 years or more, and 50 mixed tumors with 3 cures. Hinman[3] traced 18 cases in which the tumor had been examined: 9 were of pure round celled carcinoma—2 living, 12, 13 years; 9 were of teratomata—all dead except one, living 16 months. Hinman advocates the "radical operation" (removal of the primary retroperitoneal lymphatic zone) and Chevassu[6] records two personal instances of the radical operation. Considering the primary mortality of this procedure, and on the basis of comparative statistics, it has been questioned, by Coley and by others, whether the results are better than those of simple orchidectomy.

While malignant disease of the retained (abdominal) testis is much more rare than formerly supposed (occurring about once in each 75 abdominally retained organs, and in the proportion of 1 to 15 malignant scrotal testicles, according to Bulkley[7]) it is more uniformly fatal than the latter. Of 59 reported cases, Bulkley found only 3 known to be well after two years.

In the case here reported the fortunate outcome can not be attributed to "early" operation for, although the tumor cells may not have escaped beyond the testicle, the neoplasm had been growing steadily larger for seven weeks. It would be unwise to assert or to deny that the Coley toxins influenced the result. Several cures have been recorded after orchidectomy without this prophylactic employment of Coley's fluid. It is of interest, however, to note in Coley's reported series[4], that of eight cases in which the toxins were used prophylactically after orchidectomy six remained well—eight, three, two, one, three and six years, respectively. But especially striking is his record, among several failures, of two cures (15 years, 8 years), by mixed toxins, of a proven recurrence, after 5 years, in the tongue (sarcoma) and of an apparent recurrence, in one month, in groin and iliac glands (round cell sarcoma).

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THE TREATMENT OF ACUTE INFECTIOUS OSTEOMYELITIS BY TRANSFUSION WITH IMMUNIZED BLOOD. REPORT OF CASE.

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In considering bone infection we have constantly to bear in mind the constituent parts of bone: the periosteum with its finely divided bloodvessels entering the cortex; the cortex, dense hard bone composed of vital essential bone cells, imbedded in masses of non-vital salts called the matrix; the Haversian canals—the subway through this intricate, dense mass—following a course parallel to the long axis of the bone but united one to the other by numerous intersecting lines; and the medullary canal with the nutrient foramen transmitting nutrient vessels to the medullary cavity.

The medullary canal with its marrow, fat, nerves, lymph- and blood vessels presents a fertile field for pyogenic organisms. The nutrient foramen is of great importance as it is the gateway of metastatic infection to the medullary canal.

A pyogenic microorganism is always the direct cause of an infectious osteomyelitis but the germ most frequently isolated and in pure culture is the staphylococcus pyogenes aureus. Acute osteomyelitis is frequently secondary to a furuncle or to some other superficial skin infection. The blood or lymph supply carries the infection through the nutrient foramen or canal into the medullary cavity. Here it spreads up and down practically unobstructed, and as the Haversian canals communicate with the medullary cavity these in turn become infected. Inflammatory phenomena of bone, because of its peculiar anatomical and physiological make-up, present a much more destructive and intractable process than do infections of the soft tissues. The histological structure of bone in its rigid unyielding walls with the network of Haversian canals, or intersecting subways through compact bone, is admirably laid out for the transportation of infection.

These Haversian canals make it possible for the infection to spread irregularly and to break out in distant portions of bone leaving normal areas between, the infection having failed to enter all the canals in the infected areas. It frequently happens in the same way that an area of bone is completely surrounded by infected Haversian canals and devitalized, leaving a sequestrum.

In every case of acute infectious osteomyelitis the prognosis is very grave because of the severe toxemia early in the disease and because of amyloid degeneration later. In Guyot's experience, quoted by Whitman, 54 cases of acute osteomyelitis of the femur resulted in a death rate of 60%; in all but seven of these cases the joint was involved.

The symptoms of acute osteomyelitis present a fairly definite picture. The temperature ranges between 102° and 105° F., the tongue is dry and coated and very frequently the patient is delirious, with a marked acceleration of the pulse. With these symptoms there is severe pain referred to the shaft of the bone generally near the epiphysis, intensified by pressure. There is often extensive swelling and inflammation of the soft tissues around the bone.

Early in the disease we can not be guided by the Roentgen examination as it may show what appears to be normal bone. Later it will show areas of bone destruction with normal bone between, and finally these normal areas will be cut off and become sequestra.

In the treatment of acute infectious osteomyelitis early diagnosis and immediate surgical drainage is of prime importance. There must of necessity be a prompt and thorough outlet provided for the products of infection. To lower the mortality, however, to dispense with destructive surgery and to shorten the convalescence, surgery should be supplemented with other treatment.

Our method of treatment, which we wish to describe as offering the best prospect for recovery, is,—after prompt surgery,—an attempt at passive immunization by transfusion with immune blood and subcutaneous injections with immune serum. Later on, after the danger period is well past and convalescence established, an autogenous vaccine may be used to combat the infection by active immunization, to promote wound healing, to lessen suppuration and to aid in the throwing off of the sequestra. A vaccine should never be used during the early stage when the patient is highly febrile and acutely sick, because a "negative phase" period, following the inoculation at this time will, temporarily at least, lower the resistance and may even prove fatal.

Immediately after the diagnosis is made, the patient's blood should be typed, and a suitable blood donor in the same group, with a negative Wassermann reaction, sought for. At the time of the first operation the pus obtained is cultured and a vaccine is prepared as rapidly as possible. Our immunizing vaccines are standarized to 1 billion organisms to the mil. With this vaccine, the *donor,* not the patient, is inoculated, beginning with 0.1 mil. and

doubling the dose at each injection until 1.0 mil. is reached. The inoculations may be given every second day at the start, but when the large doses are reached longer intervals must be allowed, depending on the reaction. The injections of 1.0 mil should be continued at weekly intervals as long as it is necessary to keep the donor on hand, in order to maintain a high degree of immunity in his blood.

Fig. 1. Rapid extension of the infection throughout the entire upper two-thirds of the right femur to the epiphyseal line. Very little bone production.

Blood should never be drawn for transfusion from the donor while he is in a condition of "negative phase" following an inoculation, but at least 24 to 48 hours should be allowed to elapse. The "negative phase" reaction may be general, with malaise, pain in muscles and joints, headache, nausea and rise of temperature; or local, with infiltration, swelling, redness and tenderness at the site of the injection. The phenomena may occur within from 6 to 24 hours after the inoculation; and, as already stated the blood should never be used for transfusion purposes, while the general symptoms are present. Local tenderness and induration at the site of inoculation, which sometimes persist for weeks, is *not* a contra-indication.

After the third or fourth inoculation the donor's blood should be sufficiently immune for transfusion purposes. Sixty mils. of sterile freshly prepared 2% solution of sodium citrate in freshly distilled water are placed in a 1000 mil. glass graduate and 500 mils of the donor's blood drawn directly into this receptacle, stirring constantly with a glass rod. Before using it is well to strain the citrated blood through several thicknesses of sterile gauze to remove any small clots which might clog the needle. The entire amount would be given by means of a salvarsan outfit to an adult, or child over 10 years

Fig. 2. Involvement of the hip joint. Head of femur and epiphyseal line intact.

of age. Four hundred mils. may be given to a child of 6 years.

The transfusion may be repeated at intervals of one week, and we believe if this interval is observed there will be less danger of an anaphylactic reaction following the treatment. In the intervals between the transfusions, smaller amounts of the donor's blood may be centrifugalized and the serum injected daily or at longer intervals hypodermatically in 5 to 10 mil. amounts. At the start of treatment, while the donor is being immunized, leucocytic extract may be given intramuscularly or subcutaneously at 12 to 24 hour intervals.

The affected bone or bones should be immobilized by a suitable splint and the patient kept out-of-doors on a roof or porch, as continuously as possible. Sun baths, both for the patient and the affected limb, are helpful when practical. A high calory diet, as rich in proteids as may be considered safe, and as the patient can tolerate, is recommended in order to make

up for the proteid waste resulting from the continued suppuration.

The wound is treated according to recognized surgical principles. It is left wide open and lightly packed with iodoformized gauze, or continuous saturation with Dakin's solution may be resorted to, as the judgment of the surgeon dictates.

The following record of a recent case occurring in our practice is given somewhat in detail, as it illustrates very graphically and strikingly the points brought out in the above discussion.

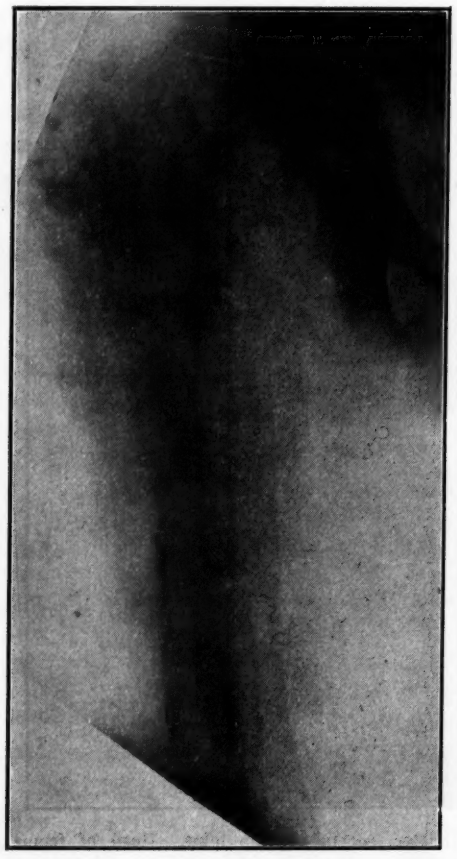

Fig. 3. One week after second transfusion with immune blood, showing very marked increase in new bone production. Head of femur out of acetabular cavity.

O. S., jr., age 7, schoolboy. Seen August 10, 1922 at which time he complained of pain in right thigh; this symptom began two days previously, immediately following a fall. The pain subsided on application of heat, and rest in bed, but later became very severe again, at which time his temperature was 105° F. There were headache and anorexia, but no vomiting. A week before the fall patient had had two large furuncles on left leg and right wrist, which promptly cleared up. No other serious illnesses except pneumonia three years previously. Physical examination was negative except for the right leg, which was swollen from the hip to the knee and held rigidly. The gluteal fold was obliterated on the right side. Palpation elicited pain throughout the full length of the femur with a point of very acute tenderness at the lower part of the upper third of the bone; no muscular spasm involving the hip-joint.

Laboratory examinations:—Several urine specimens contained a faint trace of albumin with red blood cells and pus. This condition cleared up under appropriate alkaline treatment. August 12th, w. b. c. 9,600, polynuclears 56%. August 13th w. b. c. 15,400, polynuclears 71%. Operation was done under gas-oxygen anesthesia; incision over external aspect of right thigh with exposure of bone; trephine openings made and cortex removed for about 2½ inches; drainage established and wet dressing applied. Cultures showed the staphylococcus pyogenes aureus. Patient did well until August 19th when his temperature began to mount again and a red and tender swelling developed over the outer end of the right clavicle. On August 20th incision of this area evacuated considerable pus from the tissues and upon drilling into the clavicle pus was obtained from the marrow. Culture showed staphylococcus aureus, as in the femur. Blood cultures were sterile. Following the second operation the patient did well, the temperature fell from 104° to 102°, nourishment was taken better and the general physical improvement was evident. About August 30th, however, the temperature began to climb again, reaching 104 on September 2nd. Roentgen examination of right and left femurs and hip-joints disclosed extension of the osteomyelitis to the upper right epiphyseal line of the femur. There was no evidence of involvement of the hip-joint. On September 3rd, under gas-oxygen anesthesia the upper part of the right femur was exposed

Fig. 4. Regeneration of shaft of femur. No evidence of extensive sequestrum formation.

through a lateral incision. After drilling through the cortex it was found that the process was very extensive, involving the bone to the epiphyseal line. The cortex was opened up widely, taking off the greater trochanter but not touching the epiphyseal line. The wound was left gaping with establishment of thorough drainage, and bathed continuously with Dakin's solution.

The patient again did well until about September 25th, when his temperature went up and there were signs of fluid in the right hip-joint.

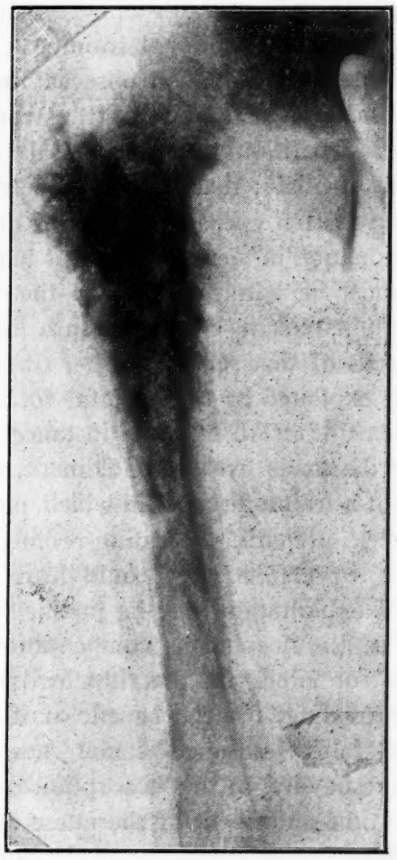

Fig. 5. Displaced head of femur returning to acetabular cavity as a result of Buck's extension.

Roentgenograms showed wide separation of the head of the femur from the acetabular cavity. The hip-joint was therefore opened with evacuation of about half a pint of pus. The hip and leg were immobilized by a proper splint. Several days later it was noticed that the head of the femur had slipped out of the acetabular cavity as a result of the extensive ligamentous sloughing and was lying on the ilium. Attempt to reduce the dislocation was deemed inadvisable at this time as the infected joint could be drained more advantageously with the dislocation present and the destructive process was so great that we feared traction on the leg might produce a surgical fracture.

Following the operation a transfusion was given. Blood cultures were again sterile. The patient did not improve. In view of the progressive and desperate nature of the infection and the fact that the child's condition was rapidly becoming hopeless in spite of our best efforts, we decided to try a method of treatment, which, so far as we know, has not hitherto been employed in a case of long-bone osteomyelitis. Judging from the startling clinical results obtained in our case it deserves serious consideration.

In discussing the treatment, it occurred to us that transfusion or intramuscular injections of *immunized* blood was a logical procedure. A vaccine of staphylococcus aureus from hip-joint cultures was prepared and the patient's father (who is in the same blood group as the child and had a negative Wassermann reaction) was immunized. The vaccine used contained one billion staphylococci to the mil. and the following dosage was used:—

Inoculation	No.	1.	0.1 mil.
"	"	2.	0.2 "
"	"	3.	0.4 "
"	"	4.	0.8 "
"	"	5.	1.0 "

The first three injections were given at two day intervals, the latter ones four to five days apart. A transfusion with this immune blood was given on October 13th. After the reaction, which came promptly, there was a decided improvement apparent; the temperature dropped from 104° to 101°, the purulent discharge diminished and there were evidences of general physical upbuilding.

The father's immunity was kept up by 1 mil. doses of the vaccine at weekly intervals. On October 30th, because of a rising temperature and evidence of deterioration, another transfusion was resorted to and it was repeated on November 5th. These were followed by extremely severe reactions —temperature rising to 106° and 107° and then dropping within 8 hours to 96.° The improvement in the patient's physical condition was very marked, however, after the reactions subsided. His temperature remained constant at about 99.4.° His lethargy disappeared and he became happy and cheerful, his appetite improving with increase in weight and strength; a truly remarkable change from the almost lifeless child of a few days before. Repeated roentgenograms show new bone production throughout the entire shaft. It is noteworthy that each time the immunized blood was used the child promptly improved after a very severe reaction. The last transfusion seems to have been the turning point in the disease and since then he has been progressing satisfactorily. When his condition had improved to the point where transfusions with immune blood were no longer considered necessary and his temperature had been normal for some time, inoculations with an autogenous vaccine were begun and have been continued at weekly intervals up to the present writing (March 1st). He is now afebrile, free from pain, looks and feels well and recent roentgenograms would indicate that the head of the femur will return to its normal position with Buck's extension. There have been no large sequestra thrown off up to the present time; it would appear from the roentgenograms that almost the entire shaft of the femur will regenerate.

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WALTER M. BRICKNER, B.S., M.D., F.A.C.S., *Editor*
New York City

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THE NURSING COURSE. STANDARDIZING A SUBSIDIARY TYPE OF NURSE.

Yale University has just announced the establishment there, by the Rockefeller Foundation, of an undergraduate school of nursing, with a course of about 28 months, in which community nursing, as well as bedside care of the individual, will be taught in an educational curriculum that will include the study of sickness in relation to heredity, environment, psychology, child development, sociologic and industrial conditions, public health. The young woman graduated from such a school will, it is planned, be fitted at once to enter public health, institutional, or private nursing, as she may prefer. While this will not be, by any means, the first nursing school connected with an American university, it will depart from the others in various features, academic and otherwise, that are foreshadowed in the report of the nursing survey made under the auspices of the Rockefeller Foundation, of which survey this new school appears to be an outcome.

The survey itself, "Nursing and Nursing Education in the United States", recently published by the MacMillan Company, is reviewed on page 127 of this issue of the JOURNAL. It makes very interesting reading, and incorporates some very definite recommendations for the education of nurses, both in the field of private care and in the rapidly expanding sphere of public health and industrial nursing. Concerning these recommendations we would speak here of the two most important, both of which represent conclusions at which, we believe, the medical profession at large has already arrived.

The first of these is that "....it is possible, with completion of a high school course or its equivalent as a prerequisite, to reduce the fundamental period of hospital training to 28 months...." (The Committee believes that "superintendents, supervisors, instructors, and public health nurses should in all cases receive special additional training...."). It must be a matter of common observation by physicians in hospitals that much of the work of the pupil nurse is repetitious and mechanical (and often unnecessarily menial), that the last few months of the course are often spent by the pupil nurse after nominal graduation in merely filling out her required time. It must be admitted that to the extent in which the pupil remains in service in a hospital beyond the needs of that service for her own training, she is being exploited by the hospital for its, rather than her, benefit. (An extreme instance of this is the observation made by Miss Goldmark, author of the survey, of a training school in which pupil nurses spent six weeks preparing operating-room gauze supplies, which, of course, they could learn to do in one.) Such exploitation may be justified from the standpoint of the hospital as compensation for the opportunity for education that it affords and as a means of providing, for the benefit of its patients, a body of fairly seasoned senior nurses. The need, if there be any, of this absorption by the hospital of the time and talent of the nurse in training, can be obviated—with advantage to the nurse, to the hospital itself, and to the community—by the general establishment of the other desideratum mentioned in the report to which we wish to draw attention, viz., the proper training and standardization of a "subsidiary group" of nurses ("practical nurse", "trained attendant" or "nursing attendant").

"According to the census of 1920, there were in the United States 300,000 nurses, male and female. Of these about half were trained registered nurses ...." We may assume, therefore, that there are now in this country fully 150,000 untrained, or partially trained "nurses"; and it is also safe to assume that their services are needed. Many of these are estimable persons, quite competent within their sphere; but many are ignorant, wholly incompetent and even vicious. They are unlicensed and therefore irresponsible. Many of them are women who, for one reason or another have failed to complete a regular nursing course, many are more or less self-

taught, some are masseuses who have drifted into or switched to "nursing", some (men) are more or less experienced as hospital orderlies. Very few are graduates of a practical, adequate course of instruction planned for "subsidiary" nurses. The survey shows that most courses for such women are of the correspondence school type, or consist in didactic lectures and class-room exercises; and that very few hospitals indeed afford any opportunity for short courses in nursing.

The working hours of our registered nurses are very long, their years of serviceability are comparatively short, and their compensation is therefore by no means excessive. Yet the expense of two trained nurses over a long period of illness—especially when the patient is himself the breadwinner of the family—is too great for people of slender means to bear. For many mild and chronic illnesses the employment of registered nurses is, too, an economic waste and, in times of epidemics, it unduly increases the demand for nursing service. There is obvious need for encouraging, not discouraging, a subsidiary type of nurse; but there is also need that such a type should be standardized by education and by licensure. The individual states should establish the standard and grant the license; the public should be taught to distinguish between the registered nurse graduated from a full course of hospital or university instruction, and what might be called the merely "licensed nurse"; the nurse registries must likewise distinguish between such licensed nurses and the unlicensed aid or attendant; and finally, but most important, our hospitals should establish a shorter course of perhaps eight months for the ward instruction of women of acceptable personality and intelligence, in the fundamentals of bedside nursing and the care of invalids. This might well be made the field of service of the hospitals too small for regular training schools.

Such a system would provide an adequate body of licensed and instructed women, competent to serve in many types of illness or in periods of convalescence; with the added dignity of licensure it would probably effect a distribution of nursing service to communities where it is now scarce; it would relieve the higher type of nurse in training of much repetitious labor, give her more time for education and relaxation and permit shortening of her course without loss to the hospital; it would give the physician a definite basis for estimating the reliability of the nurse he employs. It would not—and it should not—prevent any man or woman from lending, or hiring, his or her services as an attendant on the sick; but it should make it punishable for anyone to set himself up as a "licensed nurse" who is not.

We have, and we must continue to have, a junior or subsidiary grade of nurses. Should we not teach and standardize them? Is it not a duty to the communities that support them for our hospitals to do this teaching?—W. M. B.

Progress in Surgery

Selections from Recent Literature

High and Low Enemata—A Mistaken Conception. S. W. ELLSWORTH AND F. E. WHEATLEY, Boston. *The Boston Medical and Surgical Journal*, April 12, 1923.

Increase in pressure defeats its own object by producing a rectal spasm. Attempts to insert the tube more than six inches usually result in simply producing a coil of tubing in the rectum. There is no advantage to be gained by inserting the tube far beyond the internal sphincter, because whether it coils or not, it acts as a foreign body and produces spasm. The method found most satisfactory is to have the patient lying face down, the tube inserted just beyond the internal sphincter—usually about three inches—and the solution, heated to body temperature, given slowly with a pressure produced by not more than eighteen inches elevation. When the patient feels any discomfort, stop the flow until the sensation has passed. Many times it is possible to fill the lower portion of the ileum, with the patient feeling only the sensation produced by the presence of the rectal tube. Other times, the patient will feel the sensation produced by dilatation of the rectum, but if the flow is stopped immediately, this soon passes off and the enema is allowed to continue. As a rule, a normal adult colon will contain nearly two quarts of fluid before it becomes distended. If the amount injected does not exceed one quart, and further injection produces discomfort, it is probable that only the rectum and lower sigmoid are filled. In these cases, a delay of five minutes often relaxes spasm and the second quart can be easily injected. If it were generally known that the entire colon can be filled in practically every case without discomfort or even disagreeable sensations to the patient, the enema would be a more common procedure.

The Intracardiac Injection of Adrenalin. CARL BODON, Budapest. *The Lancet*, March 24, 1923.

Bodon adds another, personal, case to those recorded of restoration from apparent or imminent death by intracardiac injection of adrenalin. It is not necessary or advisable to give more than 1 mg. adrenalin—i.e., 1 c.cm. of the 1 in 1000 solution, in view of the possible danger of a tetanic contraction of the muscle with systolic stoppage of the heart. The solutions should be in closed ampullæ, and ought not to be more than three months old.

The instruments necessary are a good syringe and a thin needle 8 cm. in length. The site of puncture should vary with the form and size of the thorax and of the heart and with the position of the diaphragm. In order to reach the left ventricle, puncture in the fourth or fifth intercostal space and, if the heart be very much dilated, in the sixth intercostal space, one finger-breadth inward from the left border of the relative heart dullness—or somewhat inward from the apex beat if the latter can still be found—and cautiously advance inwards and upwards. Arrived at the heart muscle a light pendulum movement is felt (a good sign) and then a harder resistance as the heart muscle contracts from the irritation of the penetrating needle. Somewhat deeper resistance ceases; the needle has arrived at the ventricle, a fact definitely ascertainable by the aspiration of some blood. In order to reach the right ventricle, puncture in the fourth intercostal space, on the upper rim of the fifth rib close to the sternal border. If the diaphragm be lowered, choose the fifth intercostal space, but it is better to adhere to the fourth. The needle should pass in a sagittal direction, directed slightly inwards. At the depth of 3.5 to 4 c.cm. the pendulum movement and the resistance of the muscle can be felt, and further on the sudden sensation of the needle arriving in the cavity.

Bodon recommends adherence to the fourth intercostal space on the left sternal border, because the heart lying in this region quite close to the wall of the chest is easiest of approach, and the danger zones are avoided with certainty. It is a mistake to regard it as essential that adrenalin should get into the greater circulation. What is required is its *local stimulating action* upon the heart, which can be attained independently of reaching the right or left ventricle. It has been several times proved that it is quite enough if we inject into the muscle, be it the endo-, myo-, or epicardium.

Considering all things it seems right to recur to the very simple method of intracardiac injections and the more so as they are applied only in extremis, or very often even later, at a period when circulation and the heart's action had completely stopped. They are applied, as it were, after death, to the surviving heart. When the action of heart and respiration have stopped, one should not wait longer than 5-10 minutes.

The indications were grouped by the various authors in the following manner: (*a*) *surgical*: hypersensibility against chloroform, asphyxia during narcosis, surgical shock, impending paralysis of the heart after operations from peritoneal irritation, resuscitation of the heart during operations upon the heart, or during Trendelenburg's operation for embolism, severe shock from injury, severe and dangerous wounds of the brain, lesions caused by strong electric currents and lightning stroke; (*b*) *obstetrical*: bleeding to death, shock from inversion of the womb, asphyxia pallida of the newborn; (*c*) *internal diseases*: acute disorders of circulation in the heart, diseases of the blood-vessels, infectious diseases, poisonings, congelation.

The list of indications creates unnecessary limitations, and cannot be considered complete. In every case where the patient could have lived if some fatal state had not developed—in every case where we are induced to inject caffeine, camphor or the like—it is our duty, whenever intravenous injections prove unsuccessful, and life is dwindling away, to have recourse to intracardiac injection of adrenalin.

The Old Head Injury Case. A Clinical Study of One Hundred Cases. JOSEPH C. MICHAEL, Minneapolis, Minn. *The Journal of the A. M. A.*, April 14, 1923.

One hundred old head injury cases were studied with special reference to the degree of the vocational handicap, the neurologic complications and the probable factors in their production. The prognosis for life of the patients overcoming the immediate complications is very favorable, excepting those who incurred penetrating brain injury. Freedom from invalidity is uncommon. Careful, early treatment will do much to prevent chronic invalidity. Increased intracranial pressure and signs of local irritation are the only indications for surgery on the head in the acute as well as in the chronic case. Handling of the patients with intractable head injury syndrome constitutes a problem of great magnitude.

Transfusion of Blood from Immunized Donors. LESTER J. UNGER, New York. *The Laryngoscope*, February, 1923.

The donor is immunized by injecting huge doses of an autogenous vaccine. Starting with an initial dose of one billion, daily injections are given and as much as 100 to 150 billion organisms are given in a week. These donors develop demonstrable immune bodies. If organisms are circulating in the blood stream of a patient the diagnosis can often be made as soon as 24 hours after taking the blood culture. That same day a transfusion should be performed either before or after surgical interference has been instituted. The donor who is used for the first transfusion should be a heterogenous immunized donor. An autogenous vaccine can be prepared immediately and immunization begun. It takes about nine or ten days for a donor to develop immune bodies. If it is possible to wait that long it is advisable to do so. If it is possible to wait only five days, it is advisable to use this donor who by this time is partially immunized. If between the time of the first transfusion and the fifth day the patient is apparently worse, perform a second transfusion with another heterogenous immune donor. On the ninth or tenth day this is followed by a transfusion from the autogenous immune donor.

In selecting a donor to be immunized, one should in addition to obtaining a person whose blood is compatible with that of the patient, also select one whose phagocytic index is high. It has been found that certain donors will not to any degree develop bacterial agglutinins in response to the immunizing injections of the vaccine. Therefore, immunization should be begun on two or three donors or on one who has previously demonstrated his ability to produce these agglutinins. Before using him for the transfusion, agglutination tests against the organism found in the patient's blood should be performed to establish the fact that he has developed an immunity as a result of the inoculations. By this method of treatment a bacteremia usually can be successfully combated.

Pulmonary Tuberculosis and Appendicitis. ALEXANDER ARMSTRONG, White Haven, Pa. *The Atlantic Medical Journal*, April, 1923.

The connection of appendicitis with possible lung affection is rarely mentioned by surgical writers and if mentioned is not sufficiently emphasized to attract attention. During the past fourteen years Armstrong has been impressed with the frequency of a history of appendicitis in patients with pulmonary tuberculosis. In the records of 200 cases admitted to Sunnyrest and other private sanatoria under care during the past two years, 25 had appendicectomies, an incidence of 12½%. There have also been some cases who had definite attacks which did not come to operation. Kinghorn states that of 727 patients treated during 11 years, 43 or 5.9% had appendicitis.

In considering operation, the surgeon should have in mind the frequency of the association of the two affections and the necessity of excluding the possibility of any pulmonary involvement before operation.

Armstrong concludes:

1. Appendicitis is often tuberculous. While it may be primary it is usually secondary to a focus in the lungs, either active or dormant; rarely secondary to a lesion in the intestines.

2. Appendicitis is often followed by ill health which culminates in active pulmonary disease.

3. A careful history and physical examination, with roentgenogram if possible, should be made of all cases about to be operated upon, to discover whether there is present an active or latent lesion.

4. Local anesthesia, cocain or novocain, should be used, with gas-oxygen as second choice, and the use of ether should be condemned for these cases.

5. The convalescence should be prolonged to avoid subsequent activation of the lung lesions if present.

The Relationship Between Certain Forms of Intestinal Obstruction, Chronic Peritonitis and Chronic Multiple Serositis. CHARLES N. DOWD, New York. *Annals of Surgery*, April, 1923.

There are a few recorded cases of chronic peritonitis which has agglutinated the small intestines into relatively small globular masses. The intestinal mucous membrane becomes puckered into folds and eventually occludes the intestinal lumen. The outside appearance of this mass gives little indication of the real length of intestine which it contains. Four-fifths of the small intestine may be contracted into a mass which apparently contains about one-fifth. The cause of this peritonitis is not definitely known, but it is believed to be due to a low grade of infection or to the toxins of such infection. In certain instances the inflammation may have been tuberculous. There are many points of resemblance between this process and inflammation known as chronic multiple serositis. Indeed, similar intestinal peritonitis has in certain instances formed a part of chronic multiple serositis.

A Study of the Bile Obtained by Nonsurgical Biliary Drainage, With Especial Reference to Its Bacteriology. GEORGE MORRIS PIERSOL AND H. L. BOCKUS, Philadelphia, Pa. *The American Journal of the Medical Sciences*, April, 1923.

The authors believe that the method of biliary drainage instituted by Lyon and based upon the hypothesis of Meltzer is a useful and practical procedure, and that there is every reason for the belief that the bile obtained in this way is derived from the common bile duct, the gall-bladder, the hepatic duct and the biliary capillaries in the order given.

The diseased condition of the gall-bladder and the bile

ducts can be recognized in this way by a microscopic and bacteriologic study of the bile, which under pathologic conditions shows significant alterations. The bacteriologic study of the bile derived in this way is feasible and is of importance, but in order to be successful a rather elaborate time-consuming technic is essential. If such a technic is carried out the bacteriologic findings are useful and serve as a guide to therapeutic procedure.

The information obtained by nonsurgical biliary drainage is only a diagnostic adjunct, and in no sense should take the place of a careful history and complete physical examination. It is only when the findings derived from biliary drainage are taken in conjunction with a complete clinical study of the case that accurate conclusions can be drawn. Our knowledge of the bacteriology of the biliary and upper gastrointestinal tract is still so meagre that a great deal of work and much careful observation will be required before this phase of the subject is placed upon an entirely satisfactory basis.

Disfiguring Scars—Prevention and Treatment. GEORGE M. DORRANCE AND J. W. BRANSFIELD, Philadelphia, Pa. *The American Journal of the Medical Sciences,* April, 1923.

In plastic surgery of the head or neck, simple approximation of the skin edges leads to subsequent broadening and dimpling of the scar.

After healing has taken place in a wound approximated by a simple suture under tension, several factors enter into the alteration of the scar: (1) muscular pull; (2) contractility of the newly formed fibrous tissue; and (3) low grade infection. If the skin edges are not promptly brought together, this will be a fourth factor in the disfiguring process.

In all wounds about the face or neck, the incision as far as possible must be in the line of the muscle fibers.

Experience has shown us that the best method of preventing noticeable scar formation is to overcorrect as it were, at the primary operation. It is not sufficient to simply evert the skin edges; it is necessary to have accurate approximation of the superficial fascia and to bring fat to fat with the obliteration of all dead spaces. The use of the mattress suture with a skin coaptation button has been most satisfactory, as it permits us to obtain the conditions essential to proper scar formation.

When is the opportune time to resect an old scar? As long as the scar tissue is bright red, we know that the fibrous tissue has not finished its contraction, because when full contractility has occurred, the scar will be pale due to to the obliteration of the capillaries. No scar should be repaired until this pallor exists. The surrounding tissues are then pliable and the scar may be excised. The edges are undermined as shown and the edges are approximated by the mattress sutures with the use of the buttons.

A failure to use this everted skin-edge method where large flaps are used to repair defects will result in disfiguring scars. In flap cases, it is necessary to evert the skin edges to a greater extent than in normal wounds as we have the shrinking of the flap itself to contend with.

Are Amputation Stumps Receiving Adequate After-Care? CARL BEARSE, Boston. *The Boston Medical and Surgical Journal,* April 12, 1923.

It has been stated that there are 30,000 amputations performed yearly, and that in this country there are 500,000 persons who suffered an amputation of some type.

It may be estimated that from 16,000 to 43,000 limbs are manufactured yearly.

All flexed stumps can be prevented. Early locomotion with pylons is a preventative measure against stump flexion, and is preparatory treatment for the stump before the wearing of a permanent artificial limb.

Below-knee stumps over eight inches in length are a liability rather than an asset, because they are usually poorly nourished, have a tendency to ulcerate, are affected by cold, and the scar is liable to break open. Also, if the stump is too long the artificial limb cannot be tapered off so that both ankles will look alike.

The cases with discharging sinuses should not, it is the writer's belief, be fitted to permanent artificial limbs, because there usually is accompanying inflammation, which is oftentimes exaggerated by the wearing of such a limb. The sinus should be treated on surgical principles, and during this period a temporary limb or pylon may be worn.

There was a double Symes amputation in the series, and it was reported as satisfactory.

There were only two arm amputations in this series.

As a result of this study it was found that:

1. The average interval between amputation and ordering a permanent artificial limb was ten months. This interval was not protracted by the aged patients in the gangrenous groups, as their average was only 5.3 months. A ten-month interval is altogether too long, four to six months being ample under proper after-care.

2. Only 26% of these patients were referred to limb makers by physicians; the remainder received no professional advice in selection of a limb.

3. Only 17% had the fitting supervised by physicians.

4. 78% had no supervision whatever after the wound healed.

5. As a result, 37% had complications when they came to the limb makers, which interfered with or delayed the proper fitting.

A New Method of Treatment for Chronic Infections Involving Bone. H. WINNETT ORR, Lincoln Neb., *Nebraska State Medical Journal,* February, 1923.

Orr believes that entirely too much attention has been paid to the wound itself. This was obvious during the war, (and the Carrel-Dakin method was partly to blame). Wound treatment, contrary to the impression of many surgeons, is usually of secondary importance to certain other things except in the presence of the gas bacillus or the tetanus organism.

The basis of the treatment which Orr proposes is founded upon the principle of rest, and this applies to the wound and the wound surfaces as well as to the larger parts involved.

Complete immobilization in suitably prepared and *properly applied* splints never causes pain or disturbance. The same is true of the application of Plaster of Paris. If the wound is infected it must be drained; this applies to *every* part of the wound. It must be dressed in such a way that it is not daily or twice daily reinfected.

In operating for osteomyelitis of any kind or degree, the attempt is made to remove all infected tissue. This is usually done by "saucerizing" both soft tissue and bone. The wound is cleaned up as thoroughly as possible, and the saucer-like opening of both soft tissues and bone is gently packed with sterile vaseline and gauze. The whole area is covered with dry sterile gauze and the entire limb or part encased in a well fitting cast of sufficient extent to completely immobilize the infected part. Casts are not split and no windows are cut. If there is no indication on account of a rise of temperature for a change, this dressing is left in place for ten days to two or three weeks. Occasionally on account of temperature or odor the dressing must be changed earlier. The dressing is changed by the surgeon or his first assistant. One of the principal points in the treatment is infrequent dressings, that is, rest to the wound.

The change of dressings must be done with the same precautions as at the time of the operation. The wound is cleansed, dried, painted with iodine, a sterile vaseline pack put on, and the whole bandaged into place without in any way seriously disturbing the part or the wound. It should be left at each dressing in much the same condition as at the time of the original operation.

By this plan drainage is as free as may be required. As a rule the amount of drainage is small. If the wound has not been entirely cleaned up at the time of operation, or if one gets a mixed infection, there may of course, be complications as in any surgical wound.

Twenty-five to thirty patients have been treated by this method with much better results than formerly and without danger.

Orr again expresses his belief that stiff joints, adherent muscles and tendons, and contracture deformities result not from immobilization, but from inflammation, and damage to, and adhesions of, soft parts as well as of joint surfaces.

Postoperative Swelling of the Upper Extremity, Following Operations on the Breast and Axilla. WILLIS E. HARTSHORN, New Haven, Conn. *The Boston Medical and Surgical Journal*, April 5, 1923.

Hartshorn recommends a straight incision commencing from a point below the middle or outer third of the clavicle carried to the upper border of the breast, which it then encircles.

Exposure of the insertion of the pectoralis major is easily made, and therefore the main reason for the old incision is eliminated. The dissection of the axilla is as readily completed as formerly.

The dissection of the axilla should be clean cut. All trauma to the axillary structures should be avoided.

Postoperative swelling of the upper extremity is caused in the majority of cases by

1. Extension of cancer cells.
2. Pressure of scar tissue and tension on skin flaps.
3. Infection.
4. Trauma to axillary structures during dissection.

It can largely be avoided by

1. Careful asepsis and hemostasis.
2. An incision so placed that on healing it will not exert pressure from scar tissue on the upper portion of the axillary triangle.
3. Elimination of trauma in the dissection of the axilla.
4. The Halstead method of suturing the upper and outer skin flap high in the axilla, thus giving a redundant skin area where most needed. Plastic operations to secure closure should be avoided.
5. Care in postoperative treatment. The forearm supported by a sling should be placed at right angles to the arm. The binder across the arm and chest should exert little pressure. Passive motion should be commenced early.

Diphtheritic Otitis Media. WILLIAM J. MELLINGER, Santa Barbara, Calif. *California State Journal of Medicine*, April, 1923.

Infection of the middle-ear with non-virulent diphtheria bacilli is undoubtedly of frequent occurrence and would be recognized if cultures were made in all cases of middle-ear infection. There is nothing characteristic in the symptomatology of middle-ear infection with either virulent or non-virulent Klebs-Loeffler bacilli. Virulence is best determined by animal inoculations. Eleven instances of non-virulent infection are here reported, in all of which prompt recovery followed appropriate treatment.

Book Reviews

A Text-Book on Minor Surgery. By JOHN C. VAUGHN, M.D., Director and Visiting Surgeon, Beekman Street Hospital; Visiting Surgeon, Sing Sing Prison Hospital; Consulting Surgeon, Manhattan Eye and Ear Hospital; Consulting Surgeon Workers Health Bureau; and ATHEL CAMPBELL BURNHAM, M.D., Colonel, United States Army; in Charge of the Medical Department of Red Cross in Poland; Attending Surgeon, Volunteer Hospital. Octavo; 627 pages; 459 engravings. Philadelphia and New York: LEA & FEBIGER, 1922.

This very well illustrated and typographically attractive book fairly covers the field of minor surgery, and with due consideration to the innovations in surgical therapy that have come within recent years. Like most first editions of works of this character, and especially on this subject, it includes matter that might appropriately have been omitted and devotes insufficient space to subjects concerning which the reader would be apt to turn to such a book for guidance. Thus, paronychia is dismissed with two brief paragraphs occupying barely a half page, and no mention is made of the fact that in a large percentage of these cases adequate drainage and prompt cure can be secured without incision by merely lifting up the cuticle from the surface of the nail. The discussion of the employment of plaster of Paris deserves, in such a book, not merely five pages of text but a separate chapter, and it should have been illustrated, as should also have been the too meagre description of splints,—for the diagnosis and treatment of fractures constitute a most important part of ambulant surgical work. The book could have been improved, too, by including a section on methods of examination and differential diagnosis and by amplifying chapter 23, devoted to surgical technic and supplies.

In a work on minor surgery it is important to include references to major surgical conditions for purposes of differential diagnosis. Beyond this consideration purely major conditions should not be discussed. We cannot, therefore, refrain from criticising in this work the amount of space given to surgical therapy clearly of a major character. To cite only one or two examples out of many, we see no reason for including the operative treatment of empyema thoracis and of epithelioma of the lip. Six pages are devoted to blood transfusion; we can think of no condition not outside the field of minor surgery for which blood transfusion is indicated. In this connection, we suggest to the authors that in a second edition of their interesting book they might with advantage introduce a chapter devoted to the *first aid* treatment of major surgical injuries, including hemorrhage.

The Surgical Diseases of Children. A Handbook for Students and Practitioners. By FREDERICK C. PYBUS, M.S., F.R.C.S., Assistant Surgeon, Royal Victoria Infirmary, Newcastle-on-Tyne; Hunterian Professor, Royal College of Surgeons of England, etc. Octavo; 408 pages; 288 illustrations. Philadelphia: P. BLAKISTON'S SON & COMPANY, 1922.

When disease conditions that present group characteristics are newly classed together, and are made the special subject of a monograph, it is generally considered that a good purpose has been served. The surgical diseases of children form such a group, in that many of them are best treated only when treatment is begun very soon after birth, such as in hare-lip, club-foot and Erb's palsy, and in that some of them, as tuberculous cervical glands, intussusception and others, occur so much more frequently in children than in adults. One of this book's chief merits lies in being the first in many years to call attention to the group viewpoint in regard to children's surgical diseases.

The work is purely a descriptive one, listing the diseases under proper headings, naming their principal diagnostic and prognostic features, and giving the essentials of treatment in an up-to-date manner, for the most part. It is in the form of a manual, and, according to the preface, is not intended to be a complete treatise on the subject. Some portions that demand a fuller and even more modern presentation, are the etiology of rickets (in which no mention is made of vitamines), the treatment of Erb's palsy, which is unclear, and the actual rôle played by exercise in the treatment of deformity in anterior poliomyelitis; one receives the impression from the statements made here that any such deformity can be corrected through exercises,—an idea which is often the opposite of the truth. Sufficient emphasis on and attention to the operative treatment of Pott's disease is also lacking; instead, the stress is laid on the older principle of restraint in a frame, in bed, for 18 months to 2 or 3 years.

The book was not written for the well trained general or pediatric surgeon; but for the general practitioner it should be very useful, in understanding not only the actual treatment of, but the urgency for its early application in, this group of diseases.

Cancer of the Breast and Its Treatment. By W. SAMPSON HANDLEY, M.S., M.D., Lond., F.R.C.S., Eng.; Hunterian Professor of Surgery and Pathology in the Royal College of Surgeons of England; Surgeon to the Middlesex Hospital and to Its Cancer Charity, and Lecturer in Its Medical School. *Second Edition.* Small octavo; 411 pages; 82 illustrations. New York: PAUL B. HOEBER, 1922.

This monograph, although a second edition, deserves detailed discussion.

In the first place, emphasis should be placed upon the immense advantage gained to a surgeon who, besides his technical training also possesses a complete education as a pathologist. Handley is professor of surgery and pathology in the Royal College of Surgeons and can do his own research work.

In the second place, the direct application of the "theory of permeation", which presupposes the ramification of cancer cells through the deep fascial lymphatics by direct growth instead of discontinuous embolic spread, to operative measures is exceptionally striking, and will convince even those who nourish a contempt for the "laboratory worker" that a judicious blending of practice and theory are worth while. In order to obtain a permanent cure Handley does not remove huge areas of skin, but he undermines the skin and excises a large zone of the deep fascia and underlying muscle including that of the epigastric region through which cancer enters the abdomen. Occasionally he extirpates the anterior mediastinal glands. The pectoral muscles and axillary contents are removed as by all other surgeons and Handley also ablates part of the digitations of the serratus.

Cancer spreads like erysipelas although in a different layer. By their own proliferative power the cancer cells invade the axillary glands of the opposite side and opposite breast. In other words the process is one of direct permeation, not of retrograde embolism. By preference the cells propagate in vessels of 40-50 micra caliber which are the deep fascial lymphatics and not the larger trunk vessels. Cancer cells all show a tendency to spontaneous regression. In addition, due to poor nutrition and fibrotic changes (an obliterative perilymphangitis) many strands of cancer cells are stifled. Hence, besides the primary growth, there is a "growing edge" between which and the primary tumor there may be an area containing no or few cancer cells. Handley compares the condition to an annular ringworm with a growing edge. The whole work is based upon the use of microscopic methods upon a macroscopic scale.

Paget's disease of the nipple is declared to be an eczema secondary to a duct cancer. Cancer en cuirasse is due to early lymph obstruction.

Epigastric invasion was found in 12% of breast cancer; secondary pleural growths in 38%; the lungs were finally invaded in 25%.

The author describes his operation of "lymphangioplasty", by means of silk threads introduced to replace obliterated lymph channels, for the relief of brawny arm.

The sole item with which the reviewer takes issue is the court testimony given by Handley, in which he deposed that an injury (in a given case of rapidly growing breast cancer) was an essential factor in the causation of the subsequent (?) malignant growth. This smacks too much of the biased "expert" testimony with which we are all too familiar.

An admirable monograph, well worth reading by every surgeon and every student of the cancer question.

The Physiology of Reproduction. By FRANCIS H. A. MARSHALL, Sc.D. (Camb.), D.Sc. (Edin.), F.R.S., Fellow of Christ's College, and Reader in Agricultural Physiology in the University of Cambridge. With contributions by WLLIAM CRAMER, PH.D., D.Sc., M.R.C.S., L.R.C.P., JAMES LOCHHEAD, O.B.E.M.A., M.D., F.R.C.S.E., and CRESSWELL SHEARER, M.D., Sc.D., F.R.S. *Second Edition.* London and New York: LONGMANS, GREEN & Co., 1922.

This second and revised edition of Marshall's book should be haled with interest by all biologists and medical men, and should prove especially welcome to gynecologists, obstetricians, genito-urinary specialists, chemists and veterinarians. The information contained within its pages is basic and includes the entire realm of animal life.

The new edition is of larger format and contains 64 more pages and 35 more illustrations than the first edition. Besides William Cramer who wrote the chapter dealing with the biochemistry of the sexual organs and James Lochhead, who described the changes in the maternal organism, fetal nutrition, and the physiology of the placenta, Cresswell Shearer in the new edition has revised the chapters dealing with fertilization and determination of sex.

The immense amount of material included within the 770 pages of the book can be gleaned from a bare recital of the most important chapter headings:—breeding season, oestrus cycle in mammals with the changes occurring in the uterus, ovary and testis; fertilization; biochemistry of the sexual organs; testicle and ovary as organs of internal secretion; fetal nutrition, the placenta; changes in the maternal organism during pregnancy; innervation of the female generative organs; parturition and puerperium; lactation; fertility; the factors which determine sex and phases in the life of the individual (duration of life and cause of death).

The admirable lucidity of exposition and the careful arrangement of data according to zoological grouping adds much to the value of this book as a work of reference, making it *sui generis*. There is no other reference work in any language, as far as the reviewer is aware, that covers the same field as adequately and completely.

One serious defect, which it is hoped will be remedied in future editions, is the disregard of the newer literature in the field of gynecology. This applies to many important articles appearing since 1910. References to Veit's Handbuch of 1898, to early editions of William's Obstetrics, etc., should be deleted. The data dealing with menstruation are obsolete, otherwise the strict analogy of the "pseudo-pregnancy" described by Heape in monkeys and the menstrual exfoliation described by Schroeder and others in the human female would be apparent.

Nothing on the newer descriptions of the corpus luteum (Meyer, Schroeder, etc.) is even alluded to, and references to ovarian medication are limited to an article appearing in 1904! The repeatedly disproved assertion of Goetsch that anterior pituitary lobe extracts experimentally produces growth of the genitals in animals is still carried, and five pages are devoted to Lane-Claypon and Starling's exploded fetal hormone theory, while the equally fallacious description of the cyclical changes of the rabbit's breast published by these authors is likewise accepted. In the discussion of hermaphroditism the recent instructive human material is not even alluded to.

The foregoing criticisms, it is hoped, will induce the authors to have a clinician collaborate in the revision of succeeding editions and thus widen the appeal of this really admirable treatise.

Nursing and Nursing Education in the United States. Report of the Committee for the Study of Nursing Education, and Report of a Survey by JOSEPHINE GOLDMARK, Secretary. Octavo; 585 pages. New York: THE MACMILLAN COMPANY, 1923.

This report is the result of an intensive—and fairly extensive—study of the nursing situation in this country in its various aspects. A committee of men and women prominent in the fields of nursing education and of public health service was organized under the auspices of the Rockefeller Foundation, to survey public health nursing and the training necessary thereto. The report of that committee—of which Miss Josephine Goldmark, conspicuous for her achievements in other fields of social research, is the secretary,—constitutes but a small part of this volume; but the conclusions of the committee concerning nursing education, the desirability of a "subsidiary type" (semi-trained) nurse, etc., are set forth very precisely. Among others the committee reached the following conclusions, viz., that with preliminary high-school or equivalent education, and proper organization of the training school and nursing course, the fundamental period of hospital training may be reduced to 28 months; that superintendents, supervisors, instructors and public health nurses should receive additional training; and that the development of University Schools of Nursing for the training of leaders is of fundamental importance for the furtherance of nursing education.

The greater part of the volume is occupied by Miss Goldmark's Survey. It makes highly interesting and informative reading. It is divided into two parts. Part A concerns *Functions of the Nurse* and is devoted to: I. that rapidly growing field of service, *public health* (including industrial) *nursing*. (There are 11,000 nurses engaged in this work and the survey estimates that there is work for 50,000. The function and performance of public health and "visiting" nurses are studied as they were found under good and bad organizations). II. *the nurse in private duty* (including a consideration of the need for a subsidiary type of nursing). In the opinion of 52 physicians who were interviewed the need of nurses not fully trained was clearly indicated; but there was much diversity of opinion concerning the services rendered by "practical nurses" and the training that ought to be given for this subsidiary type.

Part B., much the larger part of the book, concerns *The Training of the Nurse*. It is an amiable, constructively

critical study of the problems and conditions of training, under- and post-graduate, as affecting the nurse, the superintendent and instructor and, incidentally, the patient and the hospital. It is based upon observations in a limited number of representative training schools in large and small hospitals of various type, and of nurses courses in universities.

This report and survey will, we are sure, be read and discussed in every forward looking training school and college course for nurses. Its preparation adds another to Miss Goldmark's lengthening list of accomplishments.

Essentials of Surgery. A Textbook of Surgery for Student and Graduate Nurses and for Those Interested in the Care of the Sick. By ARCHIBALD LEETE MCDONALD, M.D., Lecturer on Surgery, Nurses Training School, St. Lukes Hospital, Duluth, Minn.; Member Western Surgical Association. *Second Edition Revised.* Octavo; 293 pages; 49 illustrations. Philadelphia and London: J. B. LIPPINCOTT COMPANY, 1923.

This book was prepared to use as part of the study course in surgical nursing, with the object of giving the pupil an intelligent understanding of the disease processes in the treatment of which she is called upon to cooperate. The essentials of etiology, pathology, course of the disease and indications for treatment, are discussed in a sufficiently elementary manner. In this second edition, surgical gynecological lesions are included (in a new chapter), descriptions of technic are omitted, and the book has been generally revised.

Atlas Typischer Röntgenbilder vom Normalen Menschen. VON DR. MED. RUDOLF GRASHEY, a.o. Universitätsprofessor, Chefarzt der physikalischmedizinischen Abteilung des städtischen Krankenhauses München-Schwabing und wissenschaftlicher Assistent der chirurgischen Klinik in München. *Vierte Auflage.* Octavo; 236 Seiten; 227 Tafelbindern und 368 Texabbildungen. München: J. F. LEHMANN, 1923.

Grashey's atlases—of typical normal, and of pathologic and surgical, roentgenograms, respectively—have been available to the profession for 15 years, and have given valuable service for comparative reference. This, the fourth edition of the atlas of normal pictures, shows revision and, like its predecessors, contains much useful text. But even for those unfamiliar with the German language the work can be of great aid by its collection of normal pictures. In connection with the bones, especially, even a seasoned roentgenographer is sometimes puzzled to decide whether some findings represent traumatic or inflammatory lesions or are unusual variations within the normal.

Atlas und Grundriss der Gynekologischen Operationslehre. VON DR. OSKAR SCHAEFFER, Privatdozent an der Universität Heidelberg. Mit 42 farbigen Tafeln und 21 zum Teil farbigen Textabbildungen nach Originalen von Maler A. Schmitson. München: J. F. LEHMANN.

This book, published some time ago, forms volume 28 of the Lehmann atlases. In the short compass of 94 pages of text with 42 colored plates and 21 text figures the entire subject of operative gynecology is described with fair adequacy. The plates are excellent, the text condensed yet explicit.

Pathologisch-Anatomische Situsbilder der Bauchhöhle. VON DR. SIEGFRIED OBERNDORFER, a.o. Universitätsprofessor Vorstand des pathologischen Instituts am Krankenhaus München-Schwabing. 92 Tafeln in Kupfertiefdruck und 92 Abbildungen im erklärenden Text. München: J. F. LEHMANN, 1922.

This volume forms number 14 of the well known series of Lehman's Medical Atlases. The most notable fact is the wonderful plates, 92 in number, in sepia, giving admirable detail and almost stereoscopic depth. Opposite to each plate is a short commentary and an explanatory diagrammatic sketch upon which every organ is plainly indicated and labeled. The plates are photographic reproductions of freshly opened cadavers, no dissection having been performed beyond widely removing the anterior abdominal wall.

The conditions depicted cover the entire range of abdominal pathology starting with peritoneal carcinosis and tuberculosis. All varieties of ileus are shown, the various gastric displacements and deformities, colon mobile, megacolon, megasigmoid, liver and gall-bladder diseases, ovarian cysts, and the uterus enlarged by pregnancy are among the conditions graphically depicted.

This atlas should prove of great use to teachers who can utilize the plates by throwing them on the screen. The material shown is quite unobtainable for teaching in this country where autopsies are so hard to obtain.

Medical Diagnosis for the Student and Practitioner. By CHARLES LYMAN GREENE, M.D., Attending Physician, St. Luke's and Miller Hospitals; Former Professor of Medicine, Chief of the Department of Medicine and Chief of the Medical Clinic in the University Hospitals. *Fifth Edition.* Octavo; 1453 pages; 14 colored plates; 623 illustrations. Philadelphia: P. BLAKISTON'S SON & COMPANY, 1923.

The fifth edition of this large and comprehensive work has evidently been prepared very deliberately and with meticulous effort to attain up-to-dateness and, as nearly as might be possible, completeness. Every section of the work has been not only painstakingly revised but also enlarged by the addition of desirable new matter. The sections dealing with diseases of the heart and bloodvessels, which in this edition occupy close to 400 pages, have been largely rewritten to include the recent advances in the physiology of the circulatory system and in diagnosis.

The work is remarkable not merely for its comprehensiveness but also in the author's clinical soundness and critique. The introductory chapters dealing with anamnesis, the outward signs of disease, etc., are well worth reading from this standpoint. In addition to the "general index" occupying 100 pages of small print, this edition contains a "symptom index" covering over 40 pages of small print. The usefulness of a symptom index in a reference work on diagnosis needs no emphasis.

A Manual of Practical Anatomy. A Guide to the Dissection of the Human Body. In Three Parts. *Part III—The Head and Neck.* By THOMAS WALMSLEY, Professor of Anatomy, Queen's University of Belfast. Octavo; 272 pages; 96 illustrations. New York: LONGMANS, GREEN AND COMPANY, 1922.

Manuals must, of necessity, be brief, but in too many of them the brevity is almost the only merit, and most of the potential value of the work is sacrificed to it. This one, however, is so admirably constructed that its brevity is only noticed when the reader puts the book down and realizes how short an account has covered so great an amount of material. The style endows the description with an interest for its own sake, not usually experienced in works on anatomy. The illustrations are intelligent and instructive.

The presentation is an extremely practical one; a feature of it seldom utilized in anatomy text-books is the placing of different degrees of emphasis upon parts of the body of varying importance.

Well written, carefully constructed and complete manuals form a very small group of books which are in a class by themselves. This is certainly one of them, and we recommend it highly.

Greffes Testiculaires. Par Le DOCTEUR SERGE VORONOFF. Directeur de la Station de Chirurgie Expérimentale du Collège de France; Directeur-Adj. du Laboratoire de Biologie de l'École des Hautes Études. Volume in 8; 83 pages; 19 planches. Paris: GASTON DOIN, 1923.

Voronoff reviews his previous experiences with testicle grafting and communicates a chapter regarding the testicular hormones. After giving several other opinions, he concludes that the seminal cells are charged with a double function, an endocrinous and an exocrinous one. The interstitial cells play a nutritive rôle.

La Radiothérapie Profonde. Par ISER SOLOMON, Radiologiste de l'Hôpital Saint-Antoine. Duodecimo; 152 pages; 42 figures. Paris: MASSON ET CIE, 1923.

This little volume gives the basis for deep radium therapy and the technic employed. The first chapter is devoted to the penetrating powers of the ray, its diffusion, the increase of its dosage, etc. The second chapter describes the principle varieties of apparatus. The third chapter deals with dosage. The fourth discusses clinical results. The diseases considered include myomata, visceral and glandular tuberculosis, disease of the endocrine glands and of the blood, and also the various forms of malignant neoplasm.